

Study the Physiological Effects of Finasteride (Prostacare) on some Reproductive Parameters in Male Rats (*Rattus- Rattus*)

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Doi: <https://doi.org/10.37940/AJVS.2020.13.1.11>

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Abstract

This study was conducted in the veterinary medicine college in Basrah University animal house and aimed to investigate the effect of finasteride (prostacare) on male some parameters reproductive system in albino male rats (*Rattus-Rattus*). Thirty-six mature male rats with body weight 200-210 g and age 8 weeks were randomly divided into three groups (12 animals in each group). The first group was considered as a control group and treated orally with normal saline (0.9%N.S) during the experimental 30 days, the second group was treated with finasteride (0.016mg/kg of body weight orally during the experimental (30) days. and the third group was administered finasteride (0.032mg/kg of body weight orally during the experimental 30 days. The results showed a significant decrease in the sperm count, sperm motility, and live sperm and an increase in dead sperm percentage as well as a significant decrease in the level of reproductive hormones (testosterone, LH and FSH) in the treated group with finasteride compared with a control group, from this study, it was concluded that the finasteride has undesired physiological effects on fertility in albino male rats (*Rattus-Rattus*).

Keywords: Finasteride, Reproductive Parameters, Rats

دراسة فسيولوجية حول تأثير الفيناستيريد (بروستاكير) على بعض المعايير التناسلية لذكور الجرذان البيض

الخلاصة

صممت هذه الدراسة لتحري عن تأثير عقار فيناستيريد (بروستاكير) على وظيفة الجهاز التناسلي الذكري في ذكور الجرذان البيض. اذ استخدم 36 ذكر بالغ من الجرذان معدل اوزانهم يتراوح بين 200 – 210 غرام واعمارها 8 اسبوع, قسمت التجربة الى ثلاث مجاميع (12 ذكر لكل مجموعة) جرعت المجموعة الاولى فمويا بمحلول الملح الفسيولوجي (Normal slain) واعتبرت مجموعة سيطرة اما المجاميع الاخرى الاولى والثانية جرعت فمويا بعقار فيناستيريد بتركيز 0.016 ملغم و 0.032 ملغم يوميا وعلى التوالي ولمدة 30 يوما. اظهرت نتائج الدراسة الحالية انخفاضاً معنوياً ($p \leq 0.05$) في تركيز النطف وكذلك انخفاضاً معنوياً في حركة وحيوية النطف وانخفاضاً في نسب النطف الحية وارتفاعاً معنوياً في النسب المئوية للنطف الميتة في المجموعتين المعاملتين مقارنة بمجموعة السيطرة كما اظهرت نتائج الدراسة انخفاضاً معنوياً في مستوى الهرمونات التناسلية (هرمون التستوستيرون والهرمون المحفز لنمو الجريبات والهرمون اللوتيني) عند المجموعتين المعاملتين مقارنة بمجموعة السيطرة. نستنتج من الدراسة الحالية ان لعقار فيناستيريد تأثير سلبي شديد على مستويات الخصوبة في الجرذان المختبرية. *Rattus-Rattus*.

Introduction

Finasteride is a white crystalline powder insoluble in water and freely soluble in chloroform and alcohol solvents. Prostacare is film-coated tablets that contain finasteride (5 mg) and inactive ingredients. Finasteride is a steroid inhibitor of 5α -reductase type 2 that prevents conversion of testosterone to dihydrotestosterone (1). However, treatment of this case revealed increase rates of sexual dysfunction (low libido and erectile dysfunction) (2). Is sexual side effects in spite of the discontinuation of the medication, including male infertility, poor seminal quality, erectile dysfunction, libido and ejaculation disorders (3).(4) Molecular study revealed that finasteride cause damage to sperm and DNA (5). Treatment of adult male rats by usage Finasteride might cause a defective of spermatogenesis (6). Finasteride which influence on sex hormone ratio which involve problems with achieving erection and semen. In addition, the finasteride effects in fertilization, DNA damage, and alters sperm morphology (7). Finasteride is a well absorbed from gastrointestinal tract, metabolised in the liver, and eliminated by bile to faces (8). The study aimed to investigate the effects of a different doses of finasteride on reproductive efficiency through studies the physiological parameters in albino male rats.

Materials and methods

Animal

The current study carried out on 36 mature healthy adults albino male rats (8 week) were collected from the Veterinary Medicine College animal house University of Basra . Rats with weight (200-210 gm) were placed in plastic cages at the room temperature (22-25c°) under natural light and dark (12h). During the experimental period, animals were feed on standard rat pellets and provided fresh clean

water (*ad Libitum*). Before the application of experimental protocols, animals were acclimatized under the laboratory conditions for 10 days

Experimental design:

After ten days of acclimation, male rats were divided into three groups (12 group each) as following: In Control group, rats were treated daily with normal saline (0.9%) orally about 0.5ml for 30 days. Second group, rats were treated daily with finasteride about (0.016 mg/kg orally for 30 days. Third group, rats were treated daily with finasteride about (0.032 mg/kg orally for 30 day (9).

At the end of experiment, the rats were sacrificed under chloroform anesthesia. The abdominal cavity was then opened. Blood was collected by using disposable syringe (5ml) via heart. blood samples were then centrifuged at 3000 rpm for 15 min to collect the serum. The serum was then transferred into several Eppendorf tubes and stored at -4C° to analyse of different parameters. Epididymal sperms were collected by the method of (10). The epididymis were cut into small pieces in 5ml of normal saline at 32c. The sperms obtained were used for determination of sperm viability, sperm motility, and sperm count. Sperm viability test was done by the method as described in the WHO laboratory manual (11). The proportion of live spermatozoa can be determined by using staining technique of 0.5% eosin solution. Epididymal sperm motility was evaluated by the method as described by (12). Epididymal sperm count were counted by method as described by (11), by using improved Neubauer hemocytometer.

Results and discussion

Sperm parameters:

In the present study, the animals treated with different doses of finasteride drug. The current study revealed that there was a significant decrease in the sperm concentration, motility of sperm, and live sperm. While, there was a significant increase in dead sperms compared with control group. In addition, there was a significant differences of all this parameters between treatments group (Table 1).

Hormones level:-

The present study revealed that there was a significant decrease ($p \leq 0.05$) in the levels of testosterone, FSH and LH hormones of treated animals with finasteride compared with control group. In addition, there was a significant difference between the two groups treated with finasteride (Table 2).

From the results of this study can be concluded when used or treated the laboratory animals with finasteride for 30 day which caused decline the concentration, motility, and viability of sperms and elevated in the dead sperm compared with control group. The decrease in the level of testosterone hormone has a negative effect in the number of testes germinal cells and spermatogenesis process (13). The spermatogenesis process is highly sensitive to both hormone and temperature. To spermatogenesis process, a large concentrations of testosterone is required to maintain the binding of androgen protein present in the seminiferous tubules with testosterone (14). The reduction size of the seminiferous tubules might cause low sperm production (15). It has been found that prostacare (5%) lead to reduction in the total sperm count to less than 10% from normal value (16). The decrease in sperm motility in treated rats with prostacare drug might be defect in structure of spermatozoa (17). On the other

hand, seminal vesicle for sperm parameters fertility function might be altered in case of hypofunction defect (18). The seminal vesicles and the accessory sex glands are supplied fructose to the spermatozoa for normal sperm motility (19). Treatment with prostacare for 30 days lead to decline in the live sperm and elevated in the percentage of the dead sperm. This effect might be due to the effect of prostacare in Leydig cell as well as the effect of drug on a major hormone in the spermatogenesis process (testosterone hormone). In addition, prostacare has negative effect in the epididymis and Sertoli cells functions on the production of the live sperm. The Sertoli cells are responsible for the formation of sperm (20). This finding is in agreement with previous study, in which testosterone hormone level decline through the inactivation properties on adrenergic systems in steroidogenesis process or its effect on steroidogenesis enzymes in testes (21). It has been found that anti-androgenic and the steroidal anti-androgen stimulation which resulted in lowering the plasma testosterone concentration. The androgenic actions were prevented in both hypothalamus and target tissues, and negative signals inhibited, and testosterone production elevated in the testes (22). The necrosis induced in the seminiferous tubule might be decline testosterone concentration (23, 24). This finding is in agreement with previous study, in which the orally treated with steroid 5 alpha-reductase inhibitor decline both FSH (24%) and LH (16%) hormones (25).

Conclusion

In conclusion the finasteride has undesired effects on fertility (sperm parameters and reproductive hormones) in albino male rats (*Rattus-Rattus*).

Table (1): Effect of finasteride (prostacare) on sperm parameters in male rats.

Treatment/G	Sperm count x 10 ⁶	Sperm motility%	Live sperm%	Dead sperm%
Control group	142.60±0.65 a	85.16±1.01 a	88.87±0.46 a	11.14±0.77 c
Group 1	130.460±0.29 b	71.40±1.61 b	59.87±1.145 b	39.23±0.61 b
Group2	80.58±1.77 c	55.77±0.88 c	51.37±0.88 c	47.47±2.91 a
LSD	5.30	3.33	4.38	6.89

Different letters mean significant differences ($p \leq 0.05$).

Table (2): Effect of finasteride (prostacare) on the level of testosterone ,FSH and LH hormones in male rats.

Treatment/ group	Testosterone ng/ml	FSH ng/ml	LH ng/ml
Control G	4.302±0.019 a	3.881±0.193 a	4.135±0.142 a
Group 1	3.101±0.037 b	2.458±0.136 b	2.987±0.172 b
Group 2	2.562±0.006 c	1.363±0.030 c	1.541±0.040 c
LSD	1.09	0.37	0.63

Different letters mean significant differences ($p \leq 0.05$).

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