The Effect of Nandrolone Decanoate on the Testis Weight and its Histological Structure in Mature Male Albino Mice

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Abstract

This study aimed to identify the effects of different doses of Nandrolone decanoate (50 and 100 mg/kg) subcutenously every 2 days for 30 days on testis weight and histological changes which include the number of spermatogonia , spermatocyte , spermatide , lydige cells and the diameter of seminiferous tubules for treatment group in comparing with control group which injected with normal saline .

The aim of this study to assess the effect of Anabolic androgen steriads AASs on spermatogonia , spermatocyte , spermatide , lydig cells , the diameter of seminiferous tubules of testis and the weight of testis in adult male albino mice .

الخلاصة

هدفت الدراسة الحالية لمعرفه تأثير الجرع المختلفة من Nandrolone decanoate (٥٠ و ١٠٠ ملغم/كغم) التي حقنت تحت الجلد كل يومين ولمدة ٣٠ يوم على وزن الخصى ولمعرفه التغيرات ألنسجيه والتي تتمثل بعدد سليفات النطف ، الخلايا النطفيه، ارومات النطف ، خلايا ليدك وأقطار النبيبات المنوية للحيوانات المعاملة مقارنه مع مجموعه السيطرة التي حقنت بالمحلول الملحي الفسلجي .

Introduction

Anabolic androgen steriods (AASs) are synthetic derivative of testosterone which are pharmacologically important in the treatment of growth deficiency , some blood disorders and osteosis (Wood 2004 ; Feinberg *etal.*,1997) .

Several studies have reported that AASs have negative health consequence including endocrine , hepatic , cardiovascular and behavioral disturbances (Iippi & Guidi, 1999; Clark *etal* ., 1997) .

AASs compounds alter the function of the hypothalamic – pituitary– gonadal axis and as a result affect the target reproductive tissues . some authors have reported that AASs decreased density, motility and normal morphology of sperm (Holma, 1997**;** Torres– Calleja *et al*., 2001) even low doses of AASs decrease sperm quality and quantity (Dohle *etal* ., 2003)**.** Mesbah *et al* . (2007) showed that administration of AASs caused degerated change on some testicular structures . this adverse effect of AASs is due to its inducing to circulating testosterone elevation to the range likely to be used in hormonal male contraception (Daryl *et al*., 2004).

Material and Methods

Fifteen adult male albino mice (balb/c) weighting 18.4–22.8 g were randomized into three groups : two groups treated subcutenously with 50 and 100 mg/kg body weight nandrolone decanoate (ND). while control group was injected with 0.9 % normal saline , The animals were housed at 22-25 C° with 12 – h light / dark cycle .

After 30 days from injection ND the animals were sacrificed and their testes removed and weight by sensitive digital balance . the organs to body weight ratio were then calculated as mg/ 100 gm of body weight.

The testes were fixed by formaline 10% for histological sectioning (Presnell & Schreibman . 1997) . then the sections were examined by using compound microscope

and the measurements were cording by using ocular micrometer after calibrated with stage micrometer . the number of spermatogonia , spermatocyte , for 12 seminiferous tubules for each animal and 20 reading for lydig cells as well as 20 reading for the diameters of seminiferous tubules for each animal also .

Results

In this study , the weight of testis of experimental animals was significantly (P< 0.01) lower than that in the control (Figure -1-) The number of leydig cells and spermatide in experimntal rats (which injected with 50 and 100 mg / kg) were significantly (P<0.05) lower than those of control group (fig 2,3 and 6), Our study did not exert any change in the number of spermatogonia and spermatocyte in treated rats in comparing with control (**figer** 5,6).

In the present study , a significant increase (P<0.01) in the diameters of seminiferous tubules in experimental mice (which injected with 50 and 100 mg/kg) was showed (fig 4) , in addition to this findings our study showed that accumulation of odematous fluid in the lumen of semininferous tubules of treated animal.

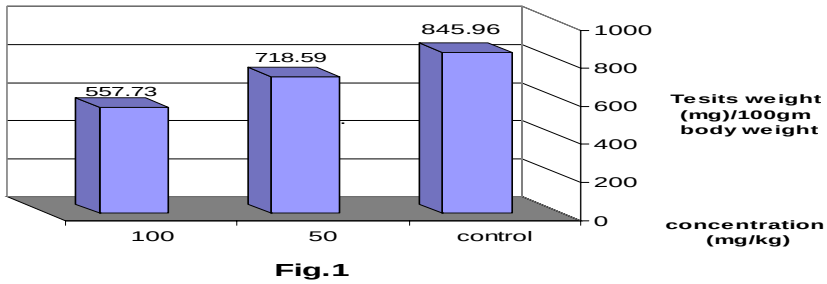
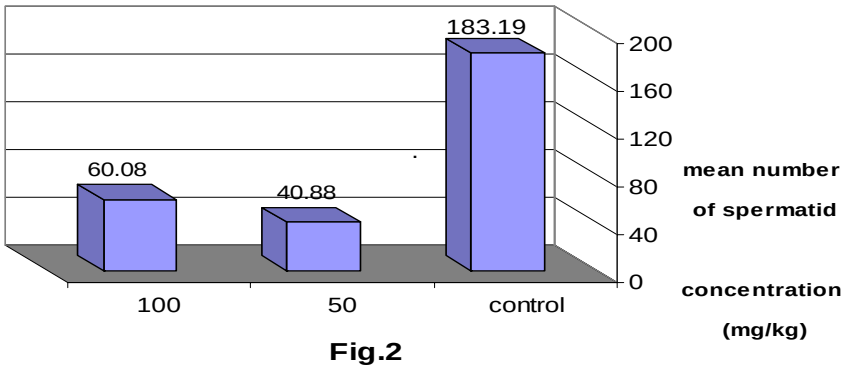
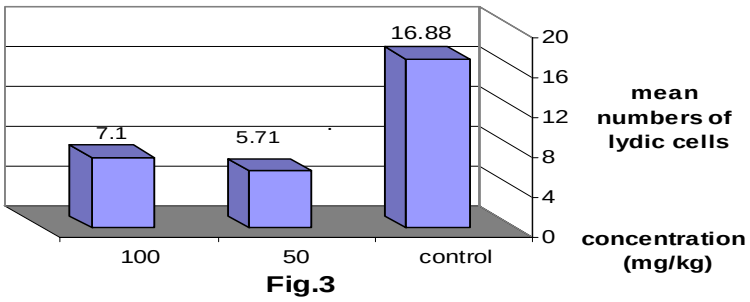


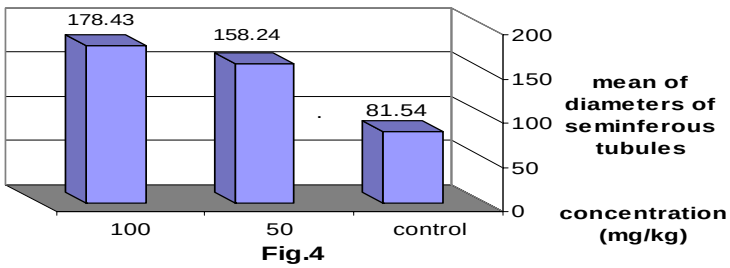
Figure (1):Testis weight (mg / 100 gm) of body weight in mail mice which treated in different doses of nandrolone decanoate . L . S . D (P≤ 0.01) = 132.84



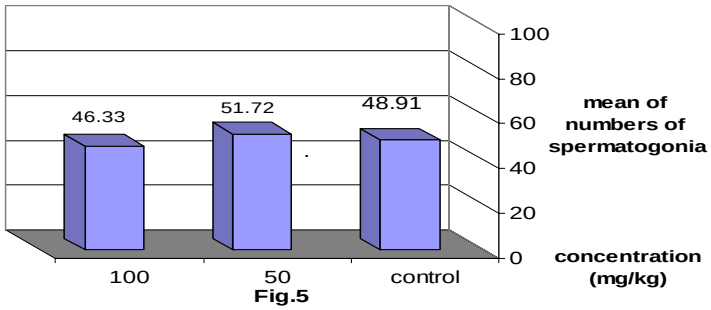
Figure(2):Mean numbers of spermatid in male mice which treated in different doses of nandrolone decanoate . L . S . D (P≤ 0.05) = 22.95



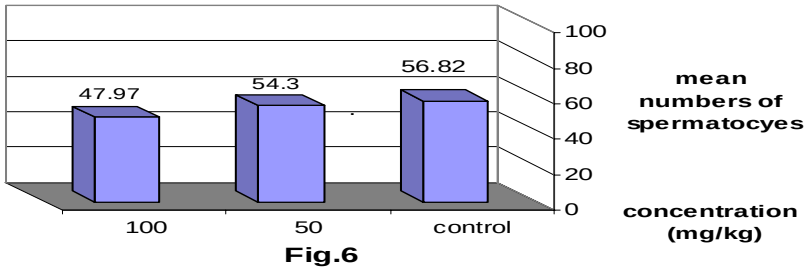
Figure(3): Mean numbers of lydic cells in male mice which treated in different doses of nandrolne decanoate . L . S . D (P≤ 0.05) = 1.83



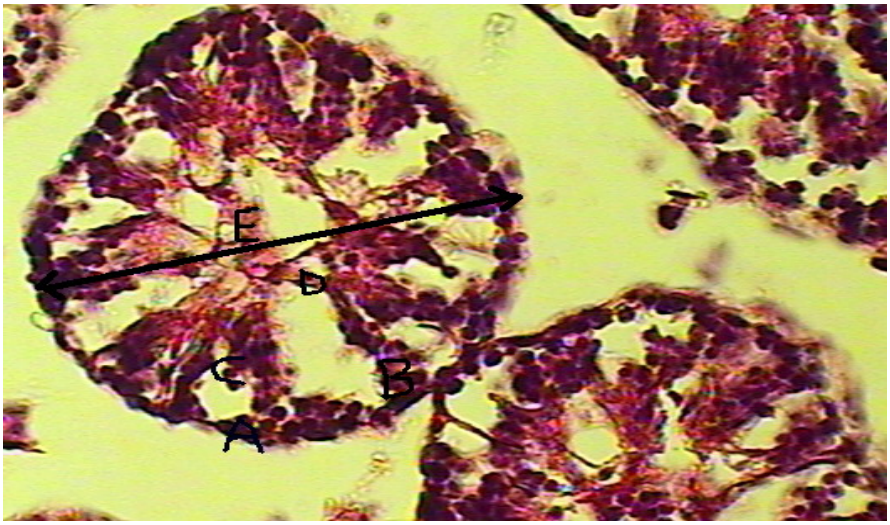
Figure(4): Mean of diameters of seminferous tubules in male mice which treated in different doses of nandroone decanoate . L . S . D (P ≤ 0.01) = 7.56



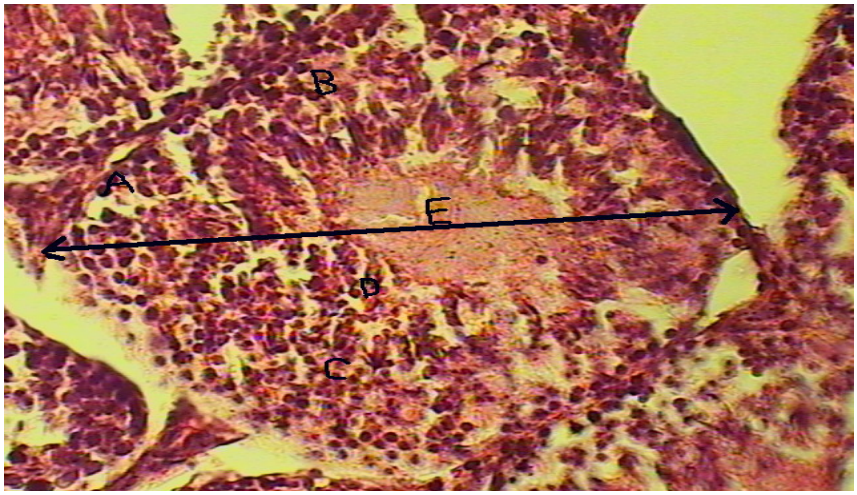
Figure(5): Mean numbers of spermatogonia in male mice which treated in different doses of nandrolone decanoate .



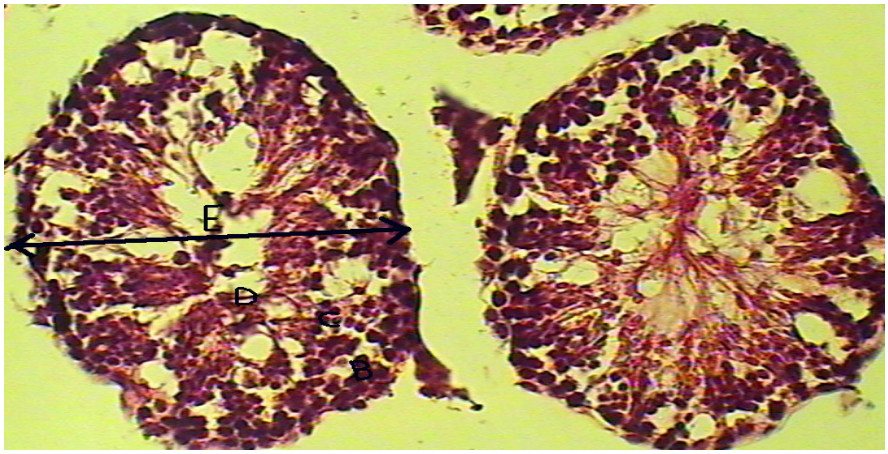
Figure(6): Mean numbers of spermatocytes in male mice which treated in different doses of nandrolone decanoate.



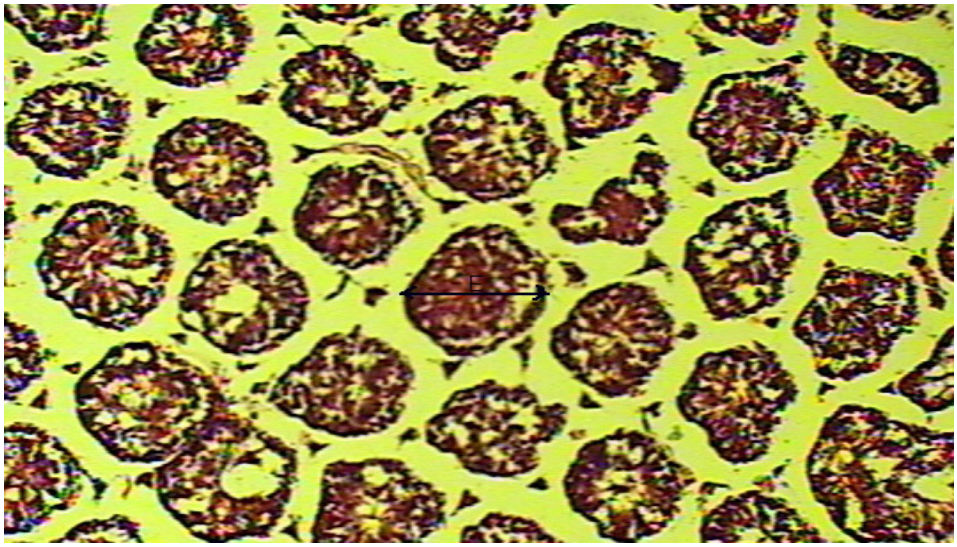
Picture (1): Cross – section (40 x) for testis of treated mice with 50 mg / kgm shows : degeneration of spermatogenic cells , inter space among seminiferous tubules , reduction the number of spermatid , disappear of spermatozoa .**A:** spermatogonia . **B:** spermatocyte . **C**: spermatid . **D**: spermatozoa **E:** diameter of seminiferous tubule.



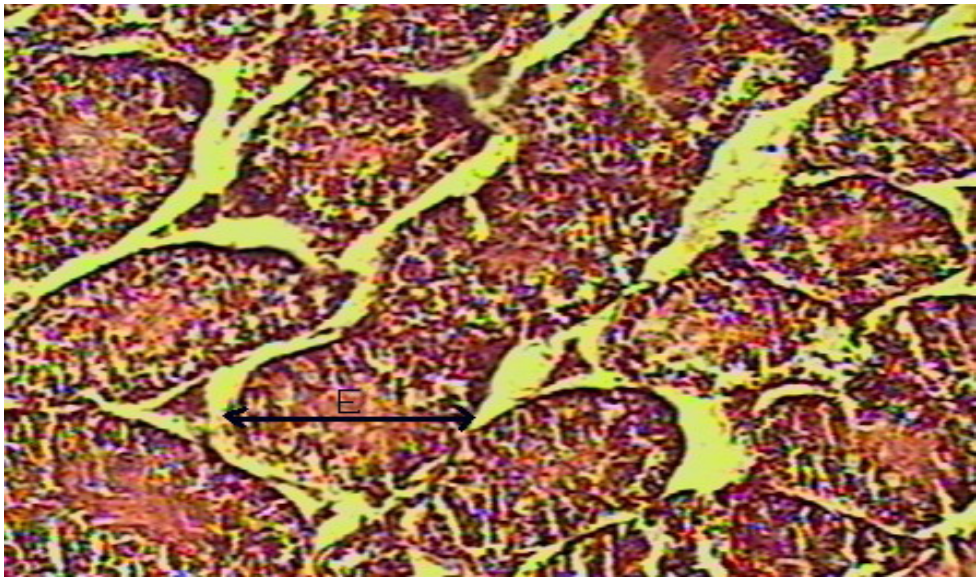
Picture(2):Cross – section (40 x) for testis of treated mice with 100 mg / kgm shows : degeneration of spermatogenic cells , reduction the number of spermatid , accumulation of odematous fluid inter tubules .**A:** spermatogonia . **B:**spermatocyte . **C**: spermatid . **D**: spermatozoa **E:** diameter of seminiferous tubule.



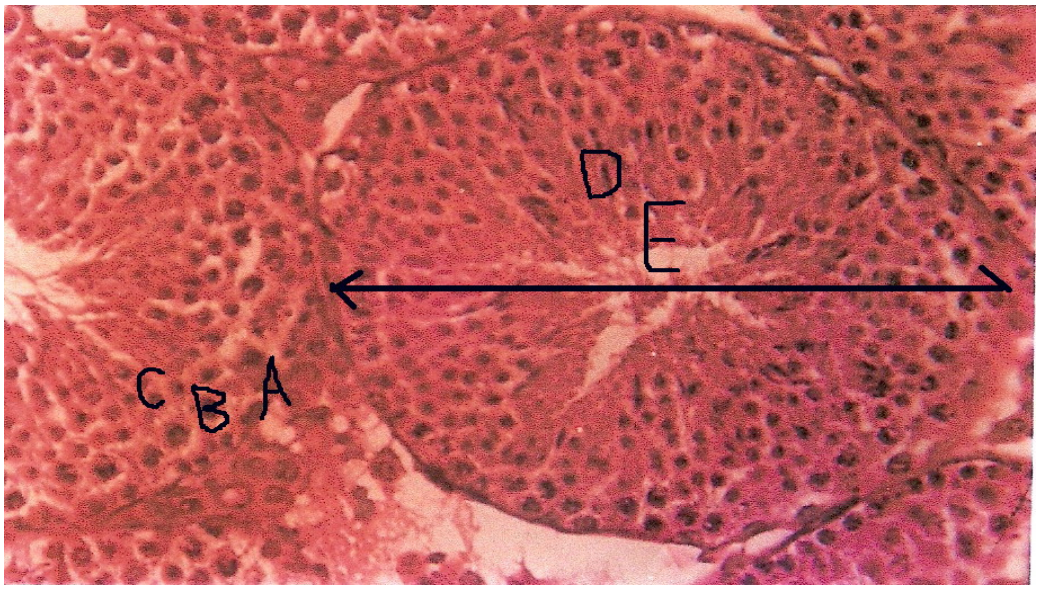
Picture(3):Cross – section (40 x) for testis of treated mice with 50mg/kgm shows : degeneration of spermatogenic cells , disappear of spermatozoa increase the diameter of seminiferous tubules , accumulation of odematous fluid inter the tubules.**B:** spermatocyte . **C**: spermatid . **D**: spermatozoa **E:** diameter of seminiferous tubule.



Picture(4): Cross – section (10 x) for testis of treated mice with 50 mg / kgm shows : degeneration of spermatogenic cells , interspaces among seminiferous tubules .
E: diameter of seminiferous tubule



Picture (5):Cross – section (10 x) for testis of treated mice with 100 mg / kgm shows : interspace among seminferous tubules , degeneration of spermatogenic cells , accumulation of odematous fluid inside tubules.**E:** diameter of seminiferous tubule



Picture(6):Cross-section(40x)for testis mice(control group).show:normal view for semniferous tubules.**A:** spermatogonia . **B:** spermatocyte . **C**: spermatid . **D**: spermatozoa **E:** diameter of seminiferous tubule.

Discussion

In this study , the weight of testis of experimental animals was significantly $P< 0.01$) lower than that in the control (Figure -1-) . this result is in agreement with Mesbah *et al.* , 2007.

It is clearly known that gonadotropin releasing hormones from pituitary gland (FSH and LH) have growth promoting effects on testis development and the administration of exogenous androgens suppresses the serum LH and FSH level in human and rats (Torres *et al* ., 2001 ; O'sullivan *et al.,* 2000) . the exogenous testosterone has negative feed – back effects on hypothalamic – pituitary – gonadal axis (Ludwig , 1950).

Under normal condition , LH is regulated by GnRh which released by hypothalamous . LH interact with receptors on the leydig cells to produce testosterone which is then transported to the testis and accessory reproductive organs for regulation of growth and maintenance of these tissue . following administration of exogenous AASs , the high level of androgen causes a decrease in LH release from the pituitary gland , which inturn results in suppression of endogenous testosterone (Fembery *et al* ., 1997 ; Lumia *et al* ., 1994) consequently , for decreased level of testosterone , testicular atrophy occurs (Ludwig , 1950) .

The number of leydig cells and spermatides in experimntal rats (which injected with 50 and 100 mg / kg) were significantly ($P<0.05$) lower than those of control group (fig 2,3 and 6) . this result was consistent with others (Mesbah etal ., 2008 and Grokett *etal* ., 1992) which they found sever depletion of leydig cells following treatment by AASs .

leydig cells are known to have receptors for LH that stimulates these cells to produce testosterone (Johnson *et al* ., 1972) .

Both LH and testosterone are responsible for normal spermatogenesis in male rats (Zirkin , 1998) . there fore , depletion of LH receptors and decrease in peripheral LH by exogenous testosterone administration result in reduction of testosterone secretion which is necessary for formation of spermatide (Ichihara *et al* ., 2001) .

Our study did not exert any change in the number of spermatogonia and spermatocyte in treated rats in comparing with control (figs. 5,6) , this may be due to AASs affects on testosterone level which is not necessary for production these cells

In the present study, a significant increase ($P<0.01$) in the diameters of seminiferous tubules in experimental mice (which injected with 50 and 100 mg/kg) was showed (fig.4) this increase may be due to decrease thickness of basement membrane in the semininferous tubules of treated animals .

This is in accordance with other reports presented negative correlation between basement membrance thickness and seminiferous tubules diameter (Aydes *et al*., 1998 ; Santero *et al* ., 1999) , or may be due to decrease in testosterone concentration and only the optimal levels of androgen can keep the normal structure of semininferous tubule (Doust *et al* ., 2007) .

in addition to this findings our study showed that accumulation of odematous fluid in the lumen of semininferous tubules of treated animal this due to increased permeability of blood vessels lead to odema between cells and release large amount of plasma from capillaries to the damge areas flowed by coagulation of tissue fluid and migration of white blood cells (Neutrophil and Monocyte) to the in flammutory region by chemotaxic agents that produced by damaged inflammatory tissues (Al–Saadi **,** 1992**) .**

In conclusion , a administration of Nandrolone decanoate exerts a clear effect on testicular structure including degenerated changes of germ cells and leydig cells . Our results suggest study the fine structure of the testis which affected with Nandrolone decanoate by using electronic microscope .

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