

Histological and Physiological Study: The Effect of Testosterone On The Reproductive System In Male Albino Rats

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ABSTRACT

Objective: The present research was done to explore the consequences of testosterone on fertility parameters in male albino rats by investigating the histological and physiological alterations of the male reproductive system of rats that were orally dosed with testosterone for 8 weeks. **Methods:** They were mature, healthy and sexually mature, aged between 8-9 weeks, obtained from the College of Sciences University of Kufa. Their weights were between 300-250 g. The animals were placed inside special plastic cages and these were sprayed Cages with sawdust periodically. The cages were taken care of, mattresses were changed and sterilized with disinfectants every three days. The animals were housed in a special air-conditioned room. The animal house was equipped with an air vacuum thermostat and an oil heater that could control the temperature between 22-25 degrees Celsius, as well as controlling the daily lighting period of 14 hours. Almost laboratory animals were given free diet and drinking water throughout the study period. There were rats left in order to prepare for two weeks before starting the experiment. There were two groups of creatures: treated with testosterone group and control group. Then Animals are sacrificed by injecting them with a mixture of xylene and ketamine immediately after their death. We make an incision in the abdominal cavity in the shape of a letter T after that the genitals are lifted, the testicles and the right epididymis are cut, the fatty tissue is removed from around the testicles and the right testicle is placed on a filter paper and weighed by an electronic scale. Then it is transferred to ethylene alcohol at a concentration of 70% for preservation, after which it is subjected to a microscopic examination to study the tissues. blood collected in anticoagulant ADTA tubes (2-3ml), to measure of LH, FSH and Testosterone level hormone. **Results:** Histopathological analysis of the testes showed decreased changes in the scorpion ducts ($p < 0.001$). LH and FSH levels of the study group were ($p < 0.05$) compared to the control and sham groups. **Conclusion:** Treatment of male albino rats with testosterone at different doses (100, 200 mg/kg) for 60 days resulted in significant reductions in body weight and penis size. Male rats were given different doses of testosterone (100, 200 mg/kg) for 60 days. Testosterone decreased testosterone. alone and reduces follicle-stimulating hormone and luteinizing hormone levels. When male rats were given different doses of testosterone (100 and 200 mg/kg) for 60 days, testosterone-related changes in the testes were observed. The prostate, epididymis, and intercellular spaces formed as a result of albino rat testosterone have a negative effect on male fertility.

Keywords: Testosterone physiology, effect of testosterone on the reproductive system, Histological Change of reproductive system.

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INTRODUCTION

The number one sex hormone and anabolic steroid in adult males is testosterone. In human beings, testosterone plays an essential role within the improvement of the testes and prostate, two male reproductive organs. It also aids inside the improvement of secondary sexual traits along

with larger bones and muscle tissues and multiplied body hair. Furthermore, testosterone impacts mood, mind-set, and the prevention of osteoporosis in each males and females. Insufficient testosterone in guys may cause issues like weakness (Haynes, 2011). Position seventeen of testosterone and position three of

testosterone's hydroxyl groups are protected inside the androstane nucleus of steroids. It is crafted from cholesterol in lots of steps, and the liver converts it into inactive metabolites. Its capabilities as an agent via binding to and activating the androgen receptor.

In humans and maximum other animals that need rationalization, testosterone is produced more often than not with the aid of the male testicles and, to a lesser extent, by means of the female ovaries. In contrast to girl adults, guys adults often have seven to eight times the quantity of testosterone of their bodies. Men create round 20 instances extra testosterone regular because of their extra pronounced testosterone metabolism. Women also are extra at risk of the hormone's results. Mooradian and friends, 1987). In addition to its natural hormonal position, testosterone is often administered as a remedy to treat breast cancer in ladies and hypogonadism in men. Older men may additionally utilize testosterone to catch up on the autumn in their testosterone stages as they age. Brazil and others (2009). For instance, it is used unlawfully to enhance an athlete's physique and abilities. The World Anti-Doping Agency classifies it as an S1 anabolic agent chemical, that means that it's far "prohibited always." After a strong rise throughout adolescence, testosterone production starts to decline around the age of thirty. A key factor in the development of sperm, testosterone is most frequently linked to sex drive. Men's body fat storage, red blood cell generation, and bone and muscle mass are all impacted by it. Additionally, a man's mood may be impacted by his testosterone levels. (Luetjens and Weinbauer, 2012).

Testosterone physiology

The essential websites of testosterone manufacturing are the lady ovaries and the Leydig cells of the male testicles. Both allow testosterone synthesis in the adrenal gland's cortex. (Dohle et al., 2003; Burger, 2002). Apart from the traditional organs such as the gonads,

adrenal glands, and placenta that still produce steroids, the mind is the website online of energetic steroid manufacturing. (Mellon et al., 2001). Classical steroids offer both progesterone and deoxycorticosterone, which are absorbed thru the flow and enter the apprehensive gadget, in addition to testosterone. On the opposite hand, this synthesis would possibly begin from scratch from the ldl cholesterol. The latter relies upon on the enzymatic capability of the brain region or cellular. The key regulatory protein is named Steroidogenic Acute Regulation Protein. (StAR) (Miller and Auchus, 2011). This phosphoprotein allows cholesterol move from the inner to the outdoor layers of the mitochondrial membrane, where it is ready for similarly breakdown via an appropriate enzymes.

The StAR gene is only expressed in steroidogenic tissues. However, Furukawa turned into the primary to reveal that StAR mRNA become expressed in a rat brain. (Furukawa et al., 1998) became proven with the aid of immunohistochemistry in several brain locations of mice and humans. The complicated manner that testosterone works is emphasised through its metabolism and steroid makeup. According to the conventional view, testosterone translocates into the cytoplasm and then binds the androgen receptor by using a genetic manner. It then enters the nucleus and attaches itself to the hormone reaction element at DNA, wherein it both stimulates or inhibits the expression of genes and the manufacturing of proteins. (O'malley and Tsai, 1994). Recently, a brand new mechanism for a non-genomic procedure became proven. This may also encompass transferring to the cellular after which at once beginning the second one messenger intracellular cascade, or it may contain attaching to its matching receptor and beginning the second one messenger cascade as a complex of hormone-receptor. (Hoppe and Michels, 2008). Recently, a brand new mechanism for a non-genomic system turned

into shown. This may consist of transferring to the cellular and then directly initiating the second messenger intracellular cascade, or it may involve attaching to its matching receptor and initiating the second one messenger cascade as a complex of hormone-receptor. (Ubuka and others, 2014). Adults release pulsatile stages of GnRH ordinarily even as they're at relaxation, and early within the morning is while testosterone rises the most.

Lord and others, (2014). But as we age, our frame produces fewer hypothalamic GnRH pulses, and Leydig mobile attrition adds to the gradually declining quantities of testosterone. For guys, a sharp drop is stated around the sixth decade of existence. Basaria (2013) stated. The growing prevalence of mental illnesses that accompany growing older is consequently partially caused by reduced testosterone and/or different androgens. However, not all research lend credence to this easy analyzing. Caustic and insensitive. Confirmed that there has been no lower in testosterone degrees among males who self-mentioned as being in excellent fitness. In fact, there was a subset of obese and smokers who had lower serum testosterone levels as they aged. (2012) Sartorius *et al.* Camacho *et al.* Determined that frame weight and life-style choices had a greater impact on retaining plasma testosterone tiers than age alone. (Camacho *et al.* 2013)

METHODS

The experimental animals were taken from the College of Sciences University of Kufa and were between 8 and 9 weeks old. They were healthy, sexually mature, and mature. Their weights were between 300-250 g. The animals were sprayed after being put into unique plastic cages. Cages with sawdust occasionally. Every three days, the bedding were replaced and disinfectants were used to sanitize the cages. The animals were kept in a designated room with air conditioning. The 14-hour daily illumination time and the temperature between 22 and 25 degrees Celsius may be controlled by

an oil heater, thermostat, and air vacuum installed in the animal housing. For the duration of the investigation, almost all laboratory animals had a free food and access to drinking water. There were two groups of creatures. Design of Experiment: Eight male white rats made comprised the control group in the first group. Eight male white rats made up the second group, which was the experimental group dosed with testosterone. Animal sacrifice: Immediately after an animal dies, it is injected with a xylene and ketamine combination to make it a sacrifice. The manner includes developing a letter T-fashioned incision in the belly hollow space, lifting the genitalia, slicing the testicles and right epididymis, getting rid of fat from the place around the testicles, and setting the right testicle on a filter paper to be weighed the use of an electronic scale. After being preserved for some time, it is moved to ethylene alcohol at a 70% attention and examined beneath a microscope to observe the tissues. Collection of blood&serum samples: Using an electric balance, the animal weights had been recorded each before to the commencement of the dosage and after the conclusion of the dosage duration. Following animal sacrifice thru coronary heart puncture, 2.5 ml of blood have been taken. The blood become then placed in Abendof tubes and allowed to clot. The separated serum changed into centrifuged for 10 minutes at a price of 3000 cycles in line with minute.

The serum become saved at minus 20 tiers Celsius until the consequences were examine. Blood values may be estimated by means of collecting 2–3 milliliters of blood in anticoagulant ADTA tubes. Samples have to be transferred between 18 and 26 tiers Celsius and refrigerated for up to six hours at 2 to 8 tiers Celsius. Before the blood decomposes, it has to be introduced returned to room temperature if it is refrigerated for round half-hour. When diagnosing and suspending samples, caution should be used. Hormone testing: Calculating the

tiers of FSH and LH: The ELISA package turned into used to assess the tiers of SST and Luteinizing Hormone. Estimation of testosterone: The Mini VIDAS device from Biomeiueusvitek, USA became used to measure serum testosterone. The final fluorescent detection of the enzyme-related fluorescence take a look at is in comparison to the enzyme immunocompetitive technique.

Histological study

Fixation: After the organ is removed from the subjects (patients), tissue samples are taken as soon as feasible and are fixed in 10% formalin right away. Following fixation, specimens are scalpel-trimmed to fit inside a tissue cassette with the proper label. Specimens should be cut so as not to touch the margins; they should not be large enough to fill the cassette. In tissue processing, dehydration and a sense are the primary phases. To get rid of the fixative and water, the tissues were run through graded alcohols at progressively higher levels (70%, 95%, and 100%).

The tissues that have been treated are positioned and aligned correctly in paraffin at 58–60 degrees Celsius in cassettes. To produce paraffin blocks, they were allowed to cool. The desired tissue had originally been exposed by cutting the tissue within the paraffin block. and then it was divided into thin slices using a microtome device that measured roughly 5 micrometers. Therefore, tissue sections are stained with histochemical stains (usually hematoxylin and eosin) to add contrast, making tissue features easier to see and measure.

RESULTS

Morphological change of rats

The male rats treated with concentrations (100 mg and 200 mg) of testosterone showed obvious lethargy and weakness in structure as well as hair loss, while these symptoms did not appear within the group under control.

Body weight changes

The research's statistical analysis showed that, when compared to the manipulate organization,

the average frame weight of the animals dosed orally with 100 mg/kg of testosterone day by day for eight weeks became appreciably lower ($P < 0.05$) in this group.

Hormones

Serum Testosterone Concentration

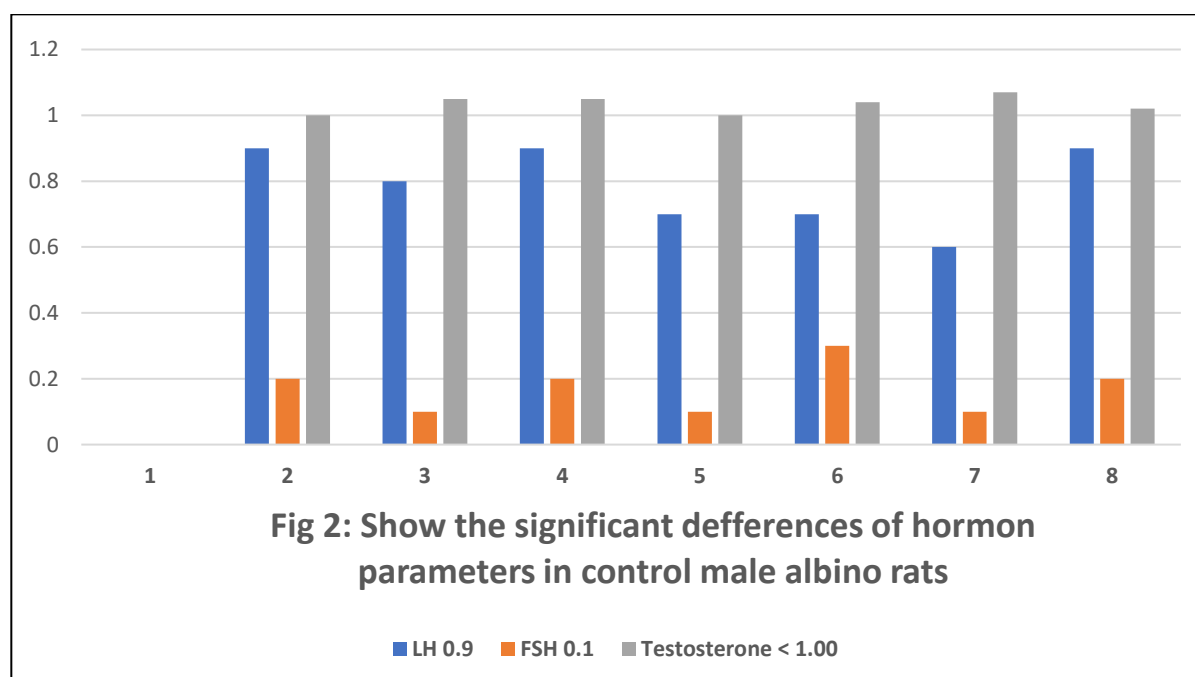
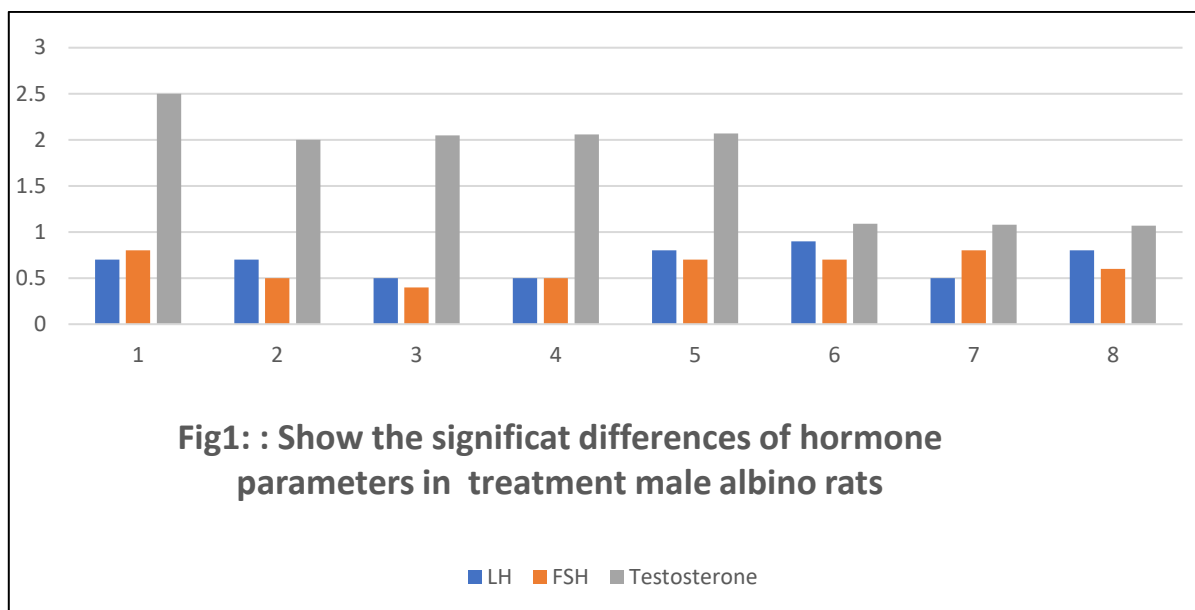
The results of the statistical analysis of the existing studies showed a considerable lower ($P < 0.05$) within the common testosterone attention for the two companies that took two exceptional doses of testosterone (100 and 200 mg/kg) orally each day for eight weeks. The common testosterone attention of the organization dosed with two hundred mg/kg of testosterone declined substantially ($P < 0.05$) in evaluation to the manipulate organization in comparison to the institution dosed with 100 mg/kg of testosterone.

Luteinizing Hormone (LH) Concentration in Serum

The effects of the statistical evaluation for this take a look at showed a enormous ($P < 0.05$) lower inside the mean awareness of LH for the two companies taking oral testosterone at two exceptional concentrations (100, 200 mg/kg) for eight weeks on a each day foundation. The group administered 200 mg/kg of testosterone had a notably ($P < 0.05$) decrease mean LH consciousness than the organization administered one hundred mg/kg of testosterone. This distinction became seen among the two organizations.

Focus of follicle-stimulating hormone (FSH) in serum

The statistical evaluation of this research revealed a considerable lower ($P < 0.05$) in the average cognizance of FSH for the two groups that took oral testosterone (100, 200 mg/day) for eight weeks. Kg) compared with the manage group, the organization dosed with a concentration of 200 mg/kg of Testosterone exhibited a huge ($P < 0.05$) drop within the imply FSH awareness than the group dosed with a focal point of 100 mg/kg of Testosterone.



Histological Changes of rats

Effect of testosterone on the diameter of testes, epididymis: Figures (4-3-1) show there is a clear increase in the diameters of the epididymis and testes of animals fed testosterone compared to the control group which demonstrates.

Histological changes

Testes: Histological analyses of the treated animals' testes reveal notable variations in the rise in sperm number-creation (spermatogonia, spermatocyte, spermatid, and spermatozoa), as seen in figure (4-3-1:A) in contrast to figure (4-3-2:B) for the control group. The structure of testes for the treated group was normal when

compared with healthy group, no alteration noticed as illustrated figures (4-3-1), (4-3-3).

Epididymis: The images (4-3-2:A) show the treated animals' epididymis. It is evident that testosterone had no discernible influence on the amount of sperm in the epididymis, and that the

secretory lining cells of the organ were clearly more active than in the control group (4-3-2:B). When comparing the fed group's epididymis structure to that of the healthy group, figures (4-3-2) and (4-3-3) showed no changes.

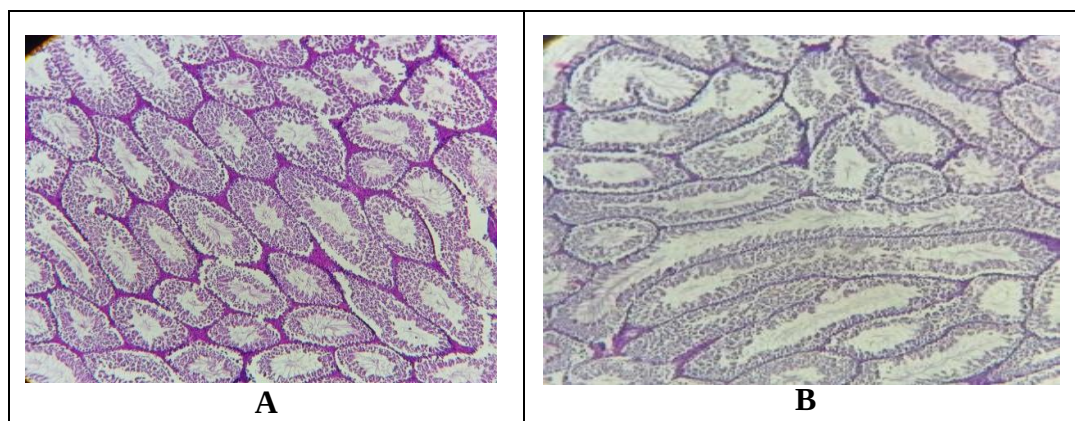


Figure (4-3-1): A: Testes of treated animal. B: Testes of control group. Magnification power was 10X

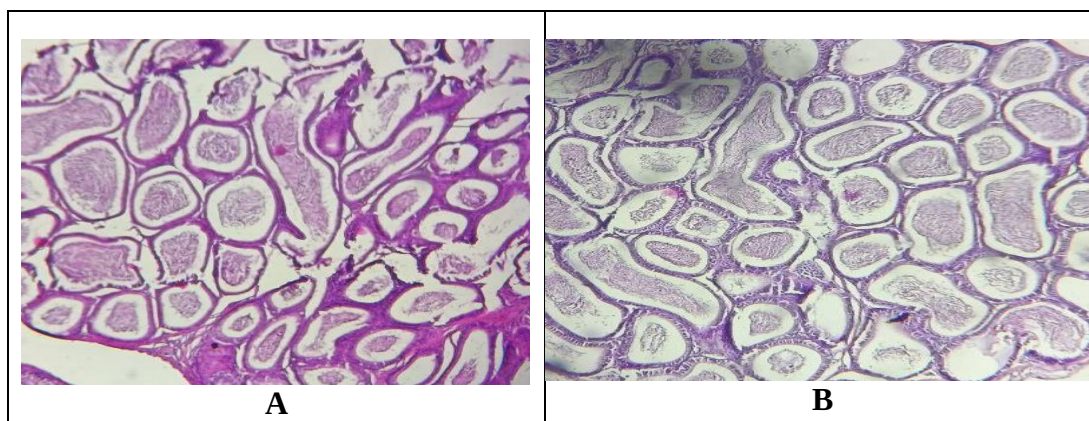


Figure (4-3-2): A: Epididymis of treated animals. B: Epididymis of control group. Magnification power 10X

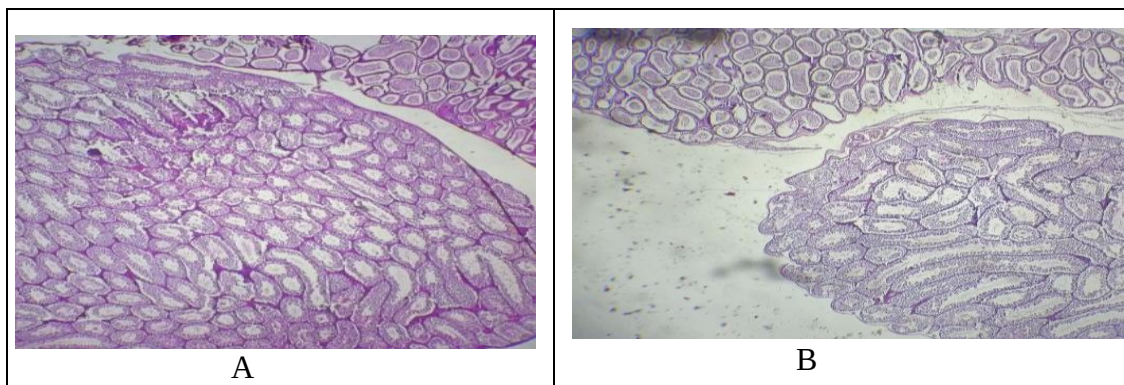


Figure (4-3-3): A: Testes and epididymis of fed animal with testosterone. B: Testes and epididymis of control group. Magnification power 4X.

DISCUSSION

Changes in body weight: The gift examine's results revealed that the various doses Testosterone (100, 200) mg/kg frame weight had a clean effect on reducing the average frame weight of male albino rats, as there was a huge ($P < 0.05$) drop inside the average body weight following the conclusion of the oral administration length. Our research supported the findings of (Sheikh et al., 2015), who mentioned that testosterone lowers body weight. The present studies additionally agreed with (Abdellatief et al., 2015). He indicated in his take a look at that all animals dealt with with Testosterone observed a drop in frame weight following oral administration to animals for 8 weeks as compared to the manage group. Numerous elements have contributed to the decrease in body mass, including the discount in testosterone stages as recommended by means of (Rolf et al., 2002), for the reason that testosterone is one of the key components of existence and fitness (Bassil et al., 2009).

Additionally, a prior study determined that testosterone can boost guys's bone and muscular mass and has a directing have an impact on on protein production in all bodily tissues and organs, and consequently a decrease in testosterone can lead to frame weight loss via a lessen in protein synthesis and a lessen in frame mass Muscle bone (Mehrdad Shariati, 2008). Red blood cell deficit can be the purpose of the lower in frame weight fee (Fawzi and Ismail, 2009). Their research shown that a lower in body weight is related to RBC scarcity.

Hormonal levels: The results of this studies showed that there was a sizeable ($P < 0.05$) decrease in the stages of intercourse hormones (FSH, LH) and testosterone in male albino rats once they had been given diverse dosages of testosterone (100, 200 mg/kg of body weight). The ranges of testosterone and intercourse hormones

(FSH, LH) after an 8-week oral remedy duration in contrast to the manipulate group. Opioids are extensively recognized for his or her ability to efficaciously lessen ache, and this effect is executed thru activating opioid receptors inside the brain, digestive tract, and spinal cord. FSH and LH on the subject of testosterone (Ballantyne, Jane. 2007). This is consistent with what we are analyzing proper now. These results have been consistent with those of (Mocktary et al., 2007), who observed that testosterone decreases because of its have an effect on on steroid enzymes inside the testes or its inhibitory results at the adrenergic systems worried in endogenous hormones. This impact may be defined by means of the anti-androgenic pastime that inhibits negative remarks in the hypothalamus, which lowers blood testosterone ranges, in addition to the anti-steroid androgen prompted motion. This decline in testosterone tiers may also be defined through the necrosis that the hypothalamus induces. The hormone degree reduced as a result of the seminal tubule (Mocktary et al., 2007).

As you have got formerly proven, a full-size lower in the quantity of interstitial cells causes a corresponding lower inside the interstitial cells' launch of testosterone. (Hibi and others, 1995). Since each FSH and LH are required for the manufacturing of spermatozoa in male rats, testosterone's direct movement at the pituitary axis leads within the suppression of each hormones' secretions, which facilitates to explain the testosterone shortfall. Accordingly, a reduction in LH causes a decrease within the release of testosterone (Ahmed and Kurkar, 2014). In each people and animals, testosterone influences male sex preference (Ciceroa et al., 2002). Our research supported the findings of (Mckim, 2003), who observed in her investigation that testosterone reduces the ranges of intercourse hormones in each sexes, hence decreasing fertility in both genders.

According to a few research, sedatives, hypnotics, and antidepressants have an unfavorable affect on intercourse hormones, which lowers each male and woman fertility (Maclean and Lee, 1999).

Our findings are in keeping with each different studies (El-Gaafarawi, 2006) which discovered that prolonged-time period testosterone use reasons a fantastic drop within the levels of testosterone, follicle-stimulating hormone (FSH), and hormone (LH) inside the blood serum of male albino rats. The identical Chowdhury (1987) furnished the findings. After an extended period of morphine impact. In a non-randomized look at, guys with ache had been given morphine for a period of 12 weeks. At the prevent of the examine, the bulk of sufferers mentioned reduced erectile disorder and sexual arousal, in conjunction with decreased degrees of testosterone and follicle stimulating hormone (FSH) (Moghaddam et al., 2013). Additionally, studies has shown that long-time period testosterone misuse negatively affects the testicular tissue of male rats.

Chronic drug addiction has been shown to decrease testosterone, harm sperm, and effect male fertility in rats (Babaei et al., 2012). While it is unclear precisely what the lengthy-time period consequences of testosterone in cells are, (Atici et al., 2005). However, lipid peroxidation, it's gift as an oblique signal due to its susceptibility to peroxidative damage because of the excessive attention of polyunsaturated fatty acids in the plasma membrane, may also deliver an cause of its dangerous effects. (2001, Taylor). Testosterone customers' semen had a markedly lower SOD hobby (Safarinejad et al., 2013), and rats given an preliminary dose of testosterone had a markedly higher stage of lipid peroxides. The study of Masini and others, (1997), Those who make use of testosterone (Panchenko et al., 1995). Our results also agrees with (Stephen and Joshua,

2009). Who supplied an reason for the decline in luteinizing and follicle-stimulating hormone levels in his research. Research has shown the significance of FSH and LH in rats, since they're important for male reproduction and the system Follicle-stimulating hormone (FSH) is critical for the right improvement of sperm and is used within the analysis and remedy of infertility instances. It also plays a position inside the regulation of fertility and the analysis and remedy of reproductive issues and pathological situations.

Without FSH, sperm development can't proceed typically. (2006) Brosen et al. This test's drop in FSH is in line with findings by using Ahmed and Kurkar (2014), which validated that testosterone without delay influences the pituitary, inhibiting the release of both FSH and LH and having an effect on male spermatogenesis. Research has shown that substance misuse and testosterone have an unfavorable influence on FSH. Sustaining this medicine consequences in a noteworthy decline inside the FSH hormone. Additionally, this investigation corroborates the findings of Selim et al. (2015), who validated that testosterone additionally induces a drop in the FSH and LH hormones. The effects of this medicinal drug were tested in more trials. Long-time period misuse of testosterone on intercourse hormones and gonadotropins. It turned into given to male albino rats testosterone. The blood serum's intercourse hormone ranges have been assessed. After 30 days of therapy, pathological and morphological abnormalities in the testicles had been visible inside the dealt with group in comparison to the control group (Elgamal et al., 2015). To reduce testosterone, FSH, and LH ranges (Elgamal et al., 2015).

Histological Change: Age-associated reduced testosterone is not unusual in men and has been associated with osteoporosis, weight problems, type 2 diabetes, coronary heart disease, and reduced libido, amongst different

damaging consequences. (Matsumoto, 2002; Travison et al., 2007). These findings have been corroborated with the aid of several in addition investigations. (Shores et al., 2006; Tivesten et al., 2009; Lehtonen et al., 2008; Laughlin et al., 2008; Khaw et al., 2007), at the same time as sure investigations (Araujo et al., 2007; Cummings-Vaughn et al., 2011). Impact of testosterone at the epididymis and testes: Based on each anatomical and practical criteria, the single helical tube that is the mammalian epididymis consists of 4 distinct components: the caput, corpus, cauda, and primary section. (Robaire and Hermon, 1988; Reid and Cleland, 1957). DHT is the maximum powerful testosterone determined within the epididymis. Androgens manipulate this organ's morphology and capability. This androgen is produced when 5α -reductase hobby transforms testosterone in epididymal epithelial cells irreversibly. In addition, a substance containing androgen binding protein (ABP) is used to manage testosterone immediately from the testis. (Penning and Jin, 2001).

CONCLUSION

This part consists of two (2) sub-parts: the article's conclusion and suggestions or recommendations from the research. Conclude the article critically and logically based on the research findings. Please be careful in generalizing the results. The authors should also state the research limitation in these parts. Generally, the conclusion should explain how the research has moved the body of scientific knowledge forward. In suggestion, please describe the author's recommendations for further studies regarding the author's research implication.

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