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Histopathological Effects of Carbamazepine on The Reproductive System of Male Rats

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Histopathological Effects of Carbamazepine on The Reproductive System of Male Rats

<p>Authors Names a. Hayder A. Majeed</p> <p>Article History Received on: 4 / 3 /2021 Revised on: 2 / 4 /2021 Accepted on: 25/4/2021</p> <p>Keywords: Carbamazepine, Spermatogonia, testis</p> <p>DOI: https://doi.org/10.29350/jops.2021.26. 2.1297</p>	<p>ABSTRACT</p> <p>This research aims to identify the effect of carbamazepine on some genital tissues of male rats. In this experiment (20) male from adult rats were randomly assigned to 2 groups, Each group comprises (10) animals. Control group gavage with distilled water, First group gavage carbamazepine concentration (20) mg/kg. After 45 days, genitals eradicated for the purpose of drugs on study then, Histological examination showed pathological changes occurred the omitted of the testis in (T1) represented by its small diameter tubular different Also, the number of cells formed for sperm cells and spermatid and leydig cells has been reduced and cells for Spermatogonia get necrosis of the facility.</p>
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1. Introduction

Pharmaceutical and treatments used in the field of therapy and pharmacy contribute to treating many diseases, relieving injuries and reducing the deterioration of human health, and the patient has always resorted to acquiring different or specific types of pharmaceutical and drugs necessary for the purpose of healing and to avoid contracting the disease again [1] despite the ability and efficiency of treatments Pharmaceutical in discouraging the various pathogens and minimizing the negative effects on the general health of the patient, but the repeated and wrong use of these pharmaceutical may result in side effects or not apparent in some cases, and their effect may appear after a period of time [2].

Carbamazepine is a white crystalline powder discovered in 1953AD and is commonly used in the treatment of epilepsy, bipolar affective disorder, schizophrenia, trigeminal neuralgia and other specific pain disorders such as lingual neuralgia [3]. Among the most important side effects of this drug are nausea, vomiting, constipation and loss. Appetite, sedation, dizziness, and sometimes impotence, the effects may include skin rashes, decreased bone marrow function, and it is also not recommended for use during pregnancy [4]. the hormonal nervous system of the organism (Coordination) [5]. The aim of this research was to investigate the effect of carbamazepine on the testicular tissues of white male rats.

2. Materials and methods:

Experiment animals:

The study included (20) a sexually mature male of the type *Rattus norvegicus*. The animals were distributed on plastic cages covered with metal clamp covers. Water and food were available *ad libitum* as needed during the 45-day trial. experimental animals were divided into two groups, each group contained 10 animals:

Control group (C): was given (1) ml of distilled water for the duration of the 45-day experiment. The treatment group (T1): was dosed with carbamazepine at a concentration of 20 mg / kg of body weight per day by following of [6].

Histological Study

The tissue sections of testes preserved in formalin 10% for both groups were prepared for the purpose of studying them and identifying the effects of carbamazepine on the testicles during period of the experiment (45) days, by following the method of [7]. prepared tissue sections of organs under study were stained using the acidic haematoxylin-eosin stain according of [8].

Histological measurements

Study the histological changes of testicular sections as follows: average diameter of the Seminiferous tubule. rate of number of sperm forming cells, which include spermatocytes, primary and secondary spermatocytes, spermatogonia, and Leydig cells, and followed the method of [9].

Statistical analysis

All data were statistically reading with SPSS program , version 16 software (2009). The results were subjected to statistical analysis using T Test to find the significant ($P < 0.05$) differences between two factors [10].

3. Results and Discussion:

1. Changes in the diameter of the tubules that transmit the semen and average number of spermatocytes, spermatogonia, and Leydig cells.

The results of the current study showed a significant decrease ($P < 0.05$) in average diameter of seminal tubules, as shown in Table (1) for the treatment group with carbamazepine compared to control group. The levels of spermatocytes, sperm cells and Leydig cells were shown to be reduced by effect of treatment with carbamazepine, and this reduction may be attributed to the estrogenic effect of the drug on the level of testosterone, causing a decrease in its concentration in the male blood plasma, which shows a negative effect in the diameters of the tubules transporting semen [11]. This is because growth and development of testicular tissue depends on regular secretion of sex hormones with influence of the hypothalamus in the brain [12].

2. Histological changes in the testicles

In the control group (C), the histological examination of the sections taken from the testicles, the clarity of the normal structure was represented by the presence of dilated, sperm-filled tubules with normal diameters, and the regularity of the basement membrane and connective tissue, images 1 and 2, while it was observed in the histological examination in the treatment group with the drug (T1) For sections taken from the testis, the testicular tissue is affected with the presence of necrosis and the degeneration of the inner lining and the presence of spaces in the connective tissue represented by the Leydig cells, and the non-division of the spermatogonia or the stopping of the division of the sperm cells with a low number of sperms, images 3 and 4.

The reason for this is that carbamazepine works by blocking the action of nerve receptors, and influencing the hormonal neuro sexual regulation of male rats, specifically androgens and the hormone testosterone, which caused the testicle not to stimulate the formation of sperm and its maturity [13] as well as the effect of the drug on the immaturity and differentiation of Sertoli cells and damage to the cells of your hand and thus It affected the stages of sperm formation [14]. And decrease activity of pituitary–testicular axis which decrease concentration of gonadal hormone [15]. the drug may due to synthesis to high amounts of free radicals in the bio system (16).

Table 1 shows the effect of carbamazepine on the average diameter of tubules that transmit the semen and on average number of spermatogenic cells and Leydig cells of male rats.

Groups	Seminiferous tubule	Leydig cells	spermatocytes	Spermatogonia
C	301.4±0.30	15.5±0.60	75.8±1.50	60.6±1.03
T1	182.5±1.01*	10.7±1.30 *	43.9±2.91*	41.5±2.09 *

C: control

T1 : Carbamazibine treatment group.

*: the presence of significant differences between the two group (P <0.05).

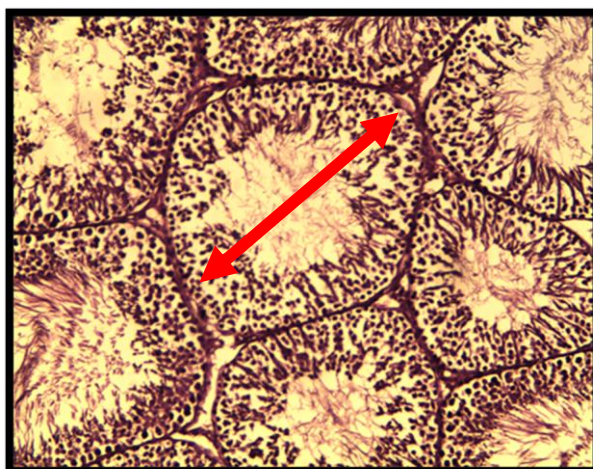


Image 2: shows a section of a rat testis from the control group showing the normal diameters and filling the seminal tubules with sperm. (Hematoxylin-eosin x 10).

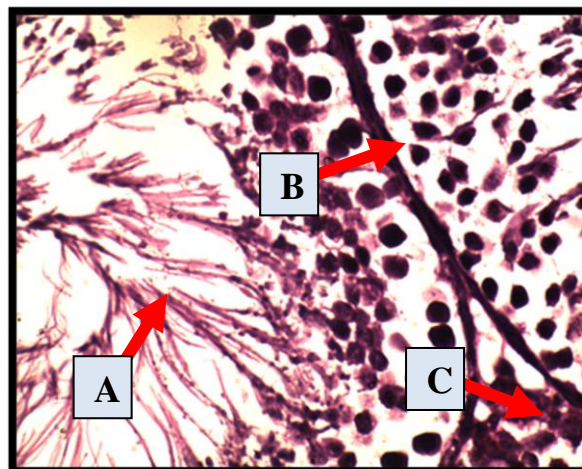


Image 1: A section of the spermatic tube of a rat testis from the control group shows the clarity of the seminiferous tubules, their fullness with sperm(A), and the regularity of Sertoli (B) and Leydig cells (C) (hematoxylin-eosin x 40).

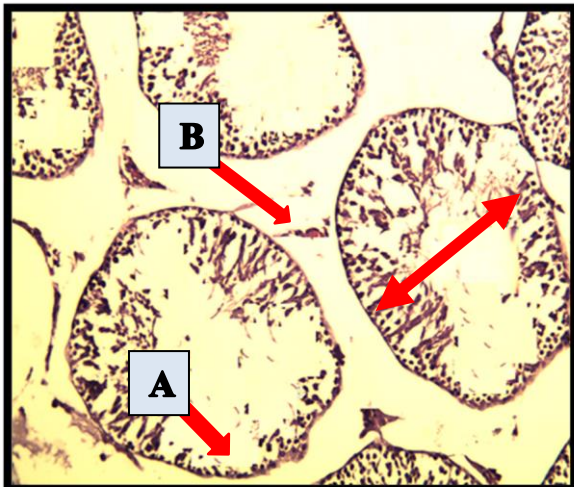


Image 4: shows a section of a rat testis from the carbamazepine treatment group (T1) showing the small diameter of the seminiferous tubules with spermatocytosis detonation and the irregularity of the connective tissue and Leydig cells (B). (Hematoxylin-eosin x 10).

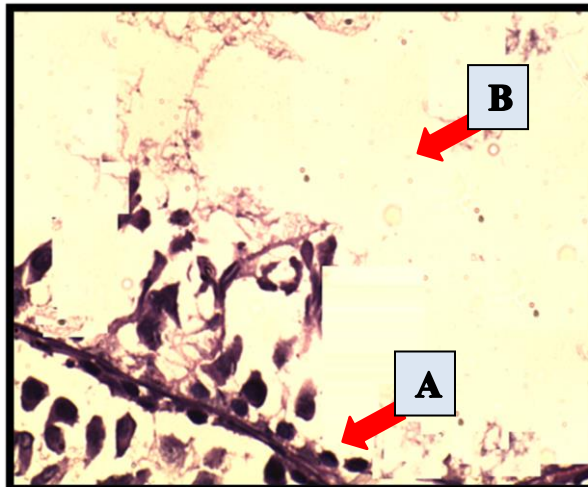


Image 3: A section of the sperm tube of a rat testis from the carbamazepine treatment group (T1) was shown, in which there is clear damage to the spermatogenesis process (A) and a lack of sperm count(B) (Hematoxylin-eosin x 40).

Conclusions:

Carbamazepine negatively affected the numbers of sperm cells and connective tissue cells of white male rats and Changes occurred in the diameter of the Seminiferous tubule in male rats treated with carbamazepine. That has caused histopathological changes in the testicles.

Recommendations:

Study of the relationship of carbamazepine use, oxidation system, and hormonal regulation. Conducting further studies to find out the effect of carbamazepine on other physiological and genetic aspects.

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