

## **EFFECT OF CINNAMON ZEYLANICUM BARK WATER EXTRACT ON MALE DIABETIC ALBINO RATS FERTILITY**

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### **ABSTRACT**

The effects of Cinnamon zeylanicum (CZ) bark extracts on productivity of male diabetic albino rats testosterone stages were studied. The experimentation was carried out on 24 male albino rats allocated into 4 equivalent groups of 6 animals each. One group was served as a normal control, whereas rats of the groups (2) were given Alloxan (120 mg.B.W / day for 3 days) by intraperitoneal injection for induction of diabetes was leftward as a diabetic control, while rats of groups (3) CZ extract treated by 500 mg.kg B.W. orally, while rats of groups (4) CZ extract treated 500 mg. BW orally, for 6 weeks without alloxan treatment. Results showed that oral administration of CZ extracts to diabetic rats for 6 weeks significant increased serum testosterone levels. The dose of extracts ameliorated the degenerative lesions which found in diabetic rats testes, This study recommend that drinking of CZ bark as a extract may be beneficial for diabetic patients who suffer from sexual impotency as it improve fertility and lessen the high blood glucose level in male diabetic rats.

### **INTRODUCTION**

Infertility is one of the main health problems in life and approximately 30% of this difficult is because of male features (1) . Numerous features be able to affect with the process of spermatogenesis and decline sperm feature and amount. Various sicknesses such as coronary heart infections; diabetes mellitus and chronic liver sicknesses have been labeled to cause harmful special effects on spermatogenesis ( 2). Instead, consumption of vitamins A, B, C and E and antioxidants can increase constancy of

testicular blood barrier and defend sperm DNA from oxidative stress that caused by vigorous free radicals (3). The male reproductive destruction expressed as rate of inequality of the oxidative stability, improved levels of enzymatic glycation produces in testicular and epididymal region, and resides on the seminal plasma (4).

Diabetes mellitus is a continuing metabolic sickness which affects millions of persons all over the world. It is described by hyperglycemia due to insulin deficit or insulin resistance. Hyperglycemia arises when the liver and skeletal muscles can not collect glycogen and/or the cells become incapable to utilize glucose. The predominant treatment of diabetes mellitus besides controlling food consumption; treating fatness; proper exercise and varying life style comprises administration of oral hypoglycemic treatments and injection of insulin( 5).

Numerous medicinal plants were observed for their hypoglycemic and antidiabetic actions and certain of them have been selected to improve original drug sources to be a protection used for treating diabetes mellitus(6) Plants have an extended early history in the traditional medicine uses that are in an increasing demand by their extracts and chemical bioactive composites for making drugs against numerous diseases (7). Cinnamon is one of the most important part in our spice rack. Not only it possesses the single characteristic as a flavoring agent, however also is famously known for its medicinal values. shared numerous traditional uses of cinnamon, for example as an astringent, germicide and antispasmodic (8). According to( 9), cinnamon was one of the chief spices used in the early treatment for chronic bronchitis. In addition to that, further traditional practices for cinnamon use in the treatment of impotence, frigidity, dyspnea, eye inflammation, rheumatism, vaginitis as well as wounds and toothaches. Cinnamon plant (family: Lauraceae) is a communal food chemical for its flavor and aromatic properties (10). In spite of using inner bark of cinnamon as a food additive in cooking or to treat digestive system and urinary problems, fight bad breath, stave off common cold and promotion of wound healing for many years, but lately it has become progressively popular for its beneficial role in glucose metabolism (11). Several studies were said that the active combinations of cinnamon (such as cinnam aldehyde, eugenol and other compounds) possess extensive ranges of pharmacological effects that seems to be highly

bioactive against diabetes by its effect on insulin secretion and stimulate glucose uptake by hepatocytes and adipocytes (12,13). Therefore, in many studies, experimental animals rats or mice were subjected to diabetes by alloxan or other drugs (14) to learning the role of cinnamon on blood glucose and its uptake by tissues with examining of histological changes in these animals (15,16). The genus cinnamomum comprises of about 250 species(17). Cinnamon bark is commonly used in Arabian states as a spice for greatest foods. In Eastern and Western folk medicine it used for treating abdominal and chest pains, chronic diarrhea, hypertension, kidney disorders and rheumatism. Intake of 3g or 6g of cinnamon bark reduced serum glucose in persons with type 2 diabetes (18). The cinnamon might have taken some biochemical /physiological changes in the sites of resistance to insulin, transmission of glucose through cell membrane, enzyme system of carbohydrate metabolism and receptor sites. The biochemical and physiological variations in the sites of resistance to insulin or other parameter are true, formerly, a permanent cure for diabetes mellitus is current in cinnamon therapy (19). (20) appearances that the active components of cinnamon are found in the water-soluble portion of cinnamon and are not present in cinnamon oil which is largely a fat-soluble. In addition to ground cinnamon which are expended directly (21). They recognized cinnamon's bioactive compound poly phenol type-A polymer which is a water-soluble.

This work aimed was designed to investigate the effects of extract of Cinnamon zeylanicum bark on male fertility as well as on testosterone levels in alloxan- diabetic rats.

## **MATERIALS AND METHODS**

### **The Plant Resources**

Cinnamon bark was bought from a limited market in Al-Qassim town Iraq.

Voucher specimens of plants were deposited to be identified and

Authenticated at University of Al-Qassim Green /Veterinary medicine collage  
Department of Anatomy & Histology

### **Preparation of bark extract**

Cinnamon bark (500 g) was thoroughly powdered and saved airtight in cool, dry and dark environments. The bark powders of Cinnamon zeylanicum (50)g was

Boiled separately in (250) ml distilled water and filtered through Whatmann no: 40 filter papers. The extracts were evaporated by room temperature.

**Animals:** Twenty four mature male of rats (150 -210 g) body weight and 6 weeks old were used in this study. Rats were obtained from the Animal house ,Collage of Veterinary medicine / University of Al-Qadysiaa. 2–3 months of age were used for the present study. Animals were caged individually under controlled standard conditions of light, temperature and humidity. They were fed with standard pellet and provided water ad libitum.

### **Groupings and Experimental Design**

The animals were randomly allocated into four groups. All group contained 6 animals.

**Group I :** Standard control (the animals were drenched normal saline only).

**Group II :** In this group animals were injected intraperitoneally alloxan (120 mg.kg / day for 3 days) for induction of diabetes

**Group III :** In this group animals were injected alloxan (120 mg.B.W / day for 3 days)for induction of diabetes with Treatment by CZ extract by 500 mg.kg ber weight. for 6 weeks .

**Group IV :** the animals were drenched CZ extract by 500 mg. B.W for 6 weeks without diabetes .

**Alloxan:** It was purchased from Alloxan-monohydrate( Sigma chemical company Ltd. England.)

At the end of the drug treatment, all the animals were anaesthetized by application of chloroform and blood samples were drawn from a group of animals from dorsal aorta by heparinized syringe in vacutainer tubes. Plasma was isolated from the collected blood by centrifugation of three thousand rpm for fifteen minutes. Separate blood examples were

collected from another group of anaesthetized animals in glass test tubes and allowed to clot for 30 mins. Serum was isolated by centrifugation by three thousand rpm for fifteen minutes. Plasma and serum samples were saved at -20°C for biochemical analysis.

**Biochemical Kits:** Glucose enzymatic kits were purchased from BioMeriux (France) for willpower of serum glucose level. Radioimmunoassay kits for approximating of the levels of serum insulin and testosterone were obtained from Biodiagnostica (USA) .

#### **Histopathological Examination:**

Testes of the treated rats were taken and fixed in 10% neutral formalin solution. The stable samples were then trimmed, washed away and dehydrated in ascending grades of alcohol. Than the samples were cleared in xylene, embedded in paraffin, sectioned at four-six microns width and stained with Hematoxylen & Iosine then examined and viability. (22 ).

#### **Statistical Analysis:**

The data were expressed as a means  $\pm$  standard error ( $\bar{X} \pm SE$ ).

Least significant different test (LSD).

## **RESULTS**

Intraperitoneal injection of alloxan (120 mg.kg ber weight.) to rats caused significant ( $P < 0.05$ ) increase testosterone of the the Cinnamon zeylanicum extracted treated male rats which was decreased by induction of diabetes by alloxan recoded in table 1

**Table 1: Consequence of oral administration of extracts of CZ for six weeks on serum testosterone hormone in male diabetic rats.**

Groups and Treatments	Testosterone level (ng/dL)
	Mean $\pm$ Stander error
Standard control normal saline 1 ml	2.39 $\pm$ 0.05
Diabetic control Alloxan (120 mg/kg)	1.42. $\pm$ 0.07*
Cinnamon zeylanicum ext. (500 mg/kg) without Alloxan	3.05 $\pm$ 0.40*
Cinnamon zeylanicum ext. (500 mg/kg) with Alloxan(120 mg/kg)	2.50 $\cdot$ $\pm$ 0.31*
L.S.D <sub>(0.05)</sub> value	<b>0.514</b>

All treated groups were compared to the diabetic control group using L.S.D<sub>(0.05)</sub> value n= 6 rats \* Significant at  $P < 0.05$

Data in Table 1 appeared that intraperitoneal administration of alloxan (120 mg/kg body weight) to normal rats induced a significant ( $P < 0.05$ ) reduction in serum testosterone hormone to  $1.42 \pm 0.07^* \text{ ng/dL}$  versus  $2.39 \pm 0.05 \text{ ng/dL}$  in the standard control rats. Oral administration of CZ extract by 500 mg/kg body weight for 6 weeks to diabetic rats produced significant ( $P < 0.05$ ) increases in serum testosterone levels as associated to the diabetic controller rats.

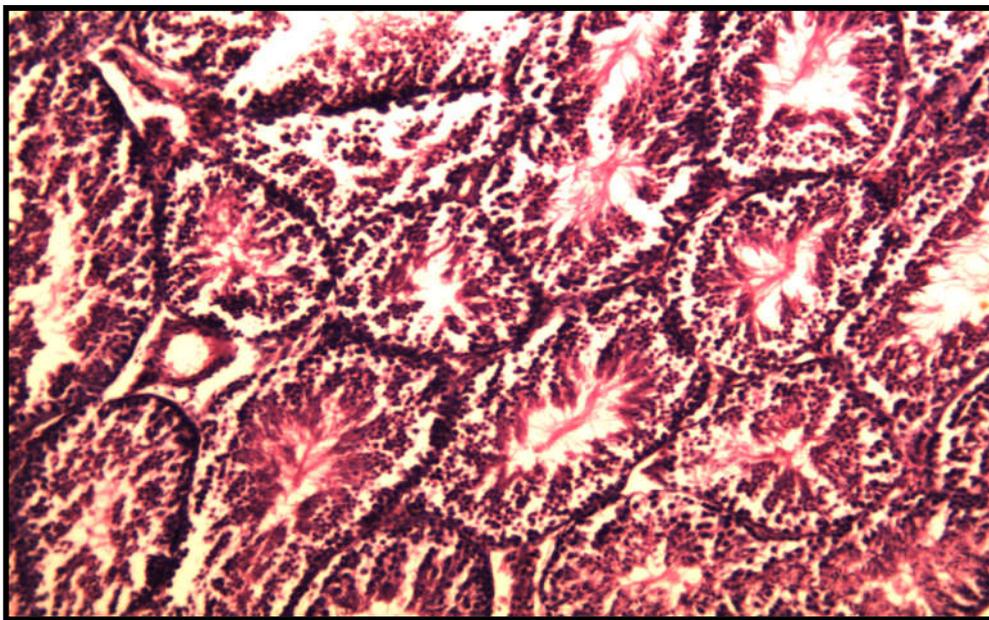


Figure (1) Testes of male rat . male rat received normal saline for 6 weeks , normally arranged seminiferous tubules which showed circled and compact with complete spermatogenesis (thin arrows). 100X H&H.

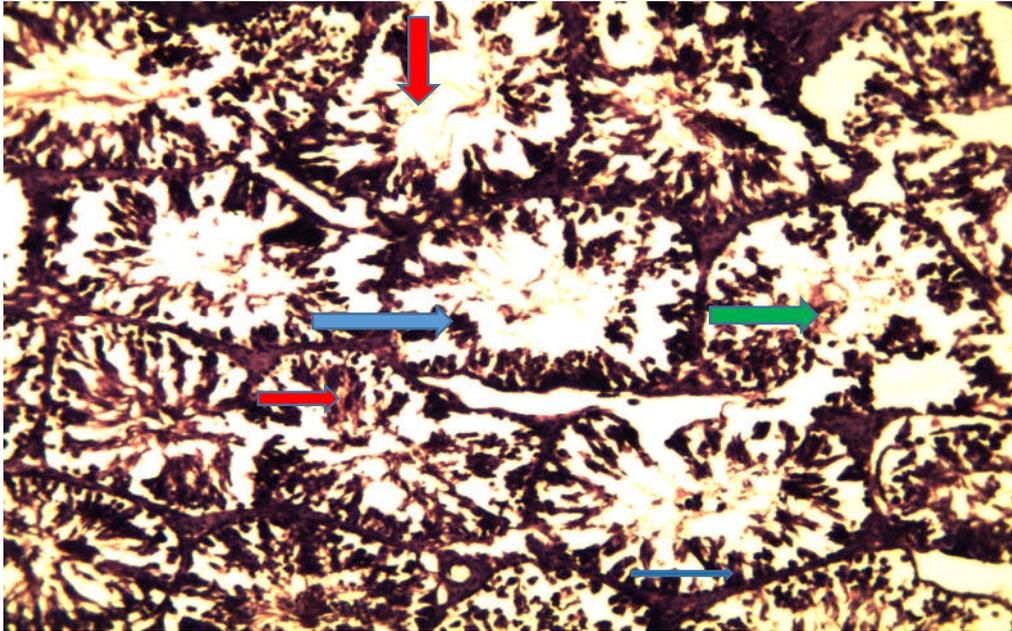


Fig (2) Testes of male rat . male rat received Alloxan(120 mg/kg B.W)I/P for 3 days. complete suppression of spermatogenesis,the seminiferous tubules (blue arrow) showed with wide lumen and empty from sperm(red arrow) vacuolation of spermatogonia,few numbers of primary and secondary spermat ocytes .Degeneration (green arrow) and few numbers of leydig cells in the interstitial tissue wher noted.100XH&E

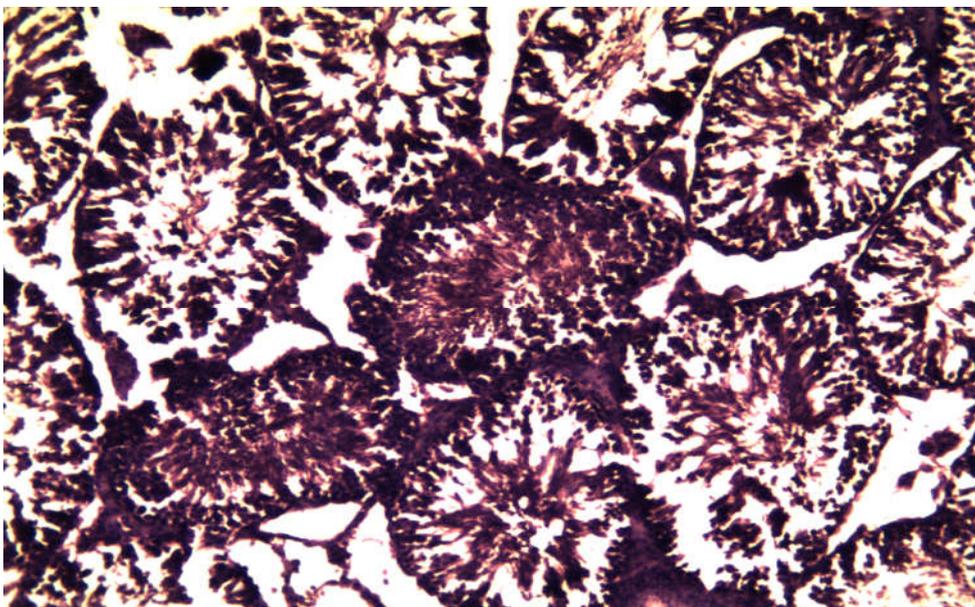


Fig (3 ) ) Testes of male rat .male rat received Cinnamon zeylanicum extract in doses of 500 mg.kg b.wt without Alloxan.Normal spermatogenesis in which the seminiferous tubules showed filled with sperm,high numbers of spermatogonia,primary and secondary spermatocytes(blue arrow) , with proliferation of leydig cells in the interstitial tissue of testes(red arrow) .(100X H&E)

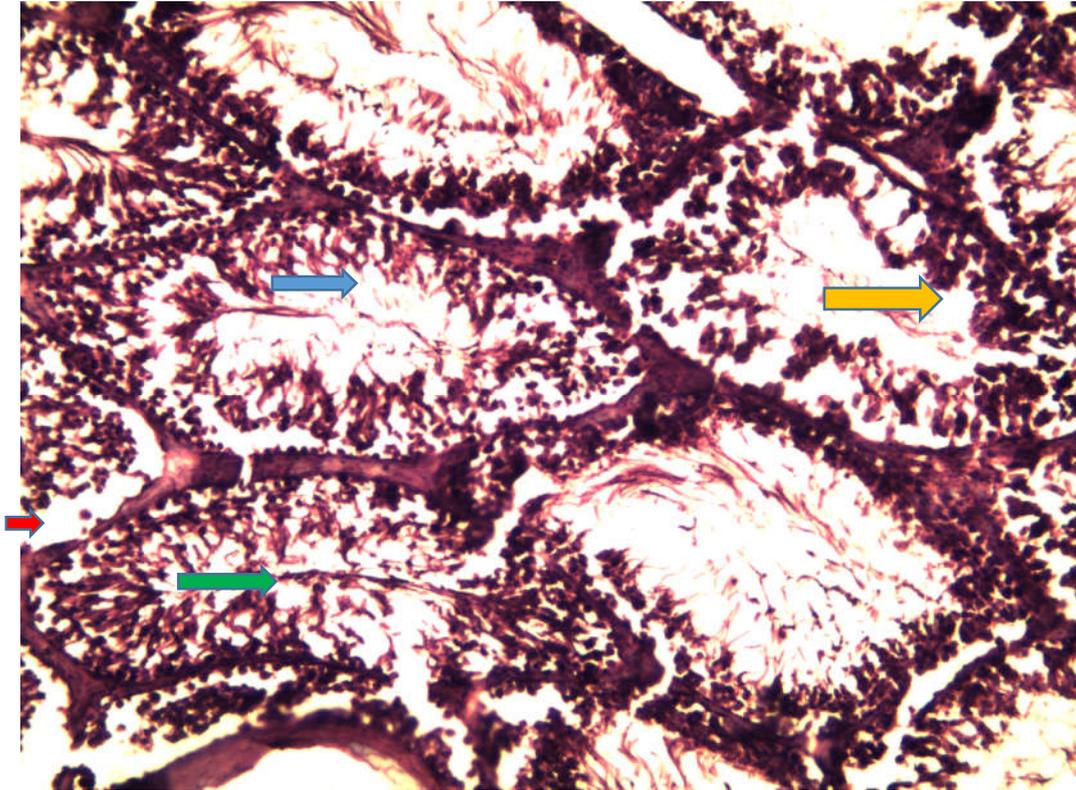


Fig ( 4) Testes of male rat . male rat received Cinnamon zeylanicum extract in doses of 500 mg.kg b.wt with Alloxan. Partial spermatogenesis(blue arrow) , the lumen of seminiferous tubules showed narrow(green arrow) ,presence of high numbers spermatogonia,and high numbers of primary and secondary spermatocytes(orange arrow). Proliferation of leydig cells in the interstitial tissue was also noted (red arrow). ( 100XH&E).

Histopathological examination of the testes of standard rats showed normal histological structure of active mature functioning seminiferous tubules associated with complete spermatogenic series as demonstrated in fig( 1).The testes of alloxan –diabetic rats revealed marked deterioration of most seminiferous tubules with nonappearance of spermatogenic chain in tubular lumen as shown in fig(2). Microscopic examination of the testes of rats assumed orally CZ extract by 500 mg.kg ber weight. Normal spermatogenesis in which the seminiferous tubules showed full with sperm. High numbers of spermatogonia , primary and secondary spermatocytes,with proliferation of leydig cells in the interstitial tissue of testes fig(3). Examination of the testes of rats assumed CZ extract by 500 mg.kg ber.weight. with Alloxan revealed normal histological

structure of most seminiferous tubules with normal spermatogenic series as demonstrated in fig( 4).

## **DISCUSSION**

Herbal treatments play an essential role in health care programmers universal and there is resurgence of interest in herbal treatments of treatment for various ailments. The World Health Organization valued that about 80% of the world's population still relies on plant-based medicines for their main health care (23). The present result showed that intraperitonea administration of alloxan (120 mg.kg b.wt./day) to standard male rats for 3 days reduced serum testosterone levels. It is well known that diabetes is positively related with lowered male fertility and sexual dysfunction .Significant variances were observed among all the four groups during the six weeks experimental period (Table 1) the current study could possibly be due to the CZ extract stimulated enlarged testosterone concentration (24,25), which is the essential for the development, growth and normal functioning of the testes and male accessory reproductive glands, and its level is positively associated with the weight of male reproductive organs. With regard to CZ extract, the current data revealed that its oral administration at the dose (500 mg.kg b.wt.) increases in serum testosterone levels as well as lessening of testicular degenerative changes which seen in the testes of diabetic rats. These results are partially similar to those reported by( 18) who concluded that intake of Three or Six gram of C Z reduced the fasting serum glucose in people with type2 diabetes.. The improvement in fertility parameters that caused by large dose of CZ extract could be attributed to its previously described antioxidant activity . (26) decided that the natural antioxidants can protect DNA and other molecules from cell damage induced by oxidation and can improve sperm quality and increase reproductive efficiency of men. Moreover, (3) described that intake of antioxidants and vitamins A, B, C and E can increase stability of testicular blood barrier and protect sperm DNA from oxidative stress caused by active free radicals. In addition, the enhancement of fertility properties which produced by CZ extract could be explained by its direct effect on the testes causing an increase in testosterone secretion which reported in this study.

## CONCLUSIONS

Conclusion ,the results obtained show that Cinnamon solution possess antihyperglycemic and antioxidant effects in diabetic animals. Which can improve fertility and lower the high blood glucose level in male diabetic rats.

تأثير مستخلص لحاء الدارسين على خصوبة ذكور الجرذان المصابة بداء السكري

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### الخلاصة

تأثير مستخلص لحاء الدارسين على خصوبة ذكور الجرذان المصابة بالسكري ومستوى التستوستيرون في هذه الدراسة. شملت الدراسة ٢٤ جرد ذكر وقسمت الى اربع مجاميع في كل مجموعة ٦ جردان. المجموعة الاولى عينات سيطرة بينما المجموعة الثانية حققت الوكسان (١٢٠ ملغم/كغم/ثلاثة ايام) داخل البريتون لاستحداث داء السكري في ذكور الجرذان وتركت عينات سيطرة للاصابة. والمجموعة الثالثة شملت معالجة ذكور الجرذان المصابة بالسكري المستحدث بالالوكسان بمستخلص لحاء الدارسين ٥٠٠ ملغم لمدة ٦ اسابيع والمجموعة الرابعة شملت جردان جرعت دارسين فقط بدون اصابة بنفس الجرعة والمدة. لوحظت النتائج للتجريب الفموي لمستخلص لحاء الدارسين للجرذان المصابة بالسكري لمدة ٦ اسابيع زيادة مستوى التستوستيرون واصلاح الافات المشاهدة في خصية الجرذان المصابة بالسكري المستحدث بالالوكسان. وهذه الدراسة توصي بتناول مستخلص الدارسين كمشروب لمرضى السكري الذين يعانون من اخلال في الهرمونات الجنسية ويزيد الخصوبة ويخفض مستوى الكلوكوز العالي في دم ذكور الجرذان المصابة بالسكري المستحدث بالالوكسان.

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