

## The Antagonistic role of Cinnamon on a destructive effect Of Alloxan on the rat testis . A Histological Study .

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### ABSTRACT:

#### BACKGROUND:

Diabetes mellitus is a chronic metabolic disorder characterized by a high blood glucose concentration (hyperglycemia) which is due to insulin deficiency and / or insulin resistance . As a consequence of the metabolic derangements various complications develop , so the aim of this investigation is to study (histological) the role of cinnamon – oil on the testis tissue of alloxan – induced diabetes rat .

#### METHODS AND METHODS :

Forty -six male rats were used and divided into 3 groups : group I , 6 = animal control . group II , 20 = treated with alloxan and the 3<sup>rd</sup> group , 20 = treated with alloxan + cinnamon .

#### RESULTS :

Testis of group I revealed normal distribution of seminiferous tubules and spermatozoa filled the lumen of these tubules . Group II showed reduction in number of seminiferous tubules , and absence of spermatozoa in their lumen , besides the significant decrease in testis weight . Group III elicited retrained these changes to approximately its normal view .

#### CONCLUSION :

This herbs ( cinnamon ) decrease or protect the destructive effect of alloxan on testis tissue

**KEY WORDS:** Alloxan, Cinnamon, Diabetes, Testis.

### INTRODUCTION:

It is well- known that some chemical agents cause destruction of the testicular tissue , some of their destruction effect are irreversible<sup>(1)</sup>.

Streptozotocine is one of these agents<sup>(2)</sup>, it is considered as an anti – tumor factor and a permanent diabetogenic agent<sup>(3,4,5)</sup>, in addition to its toxic effect on the testicular tissue<sup>(6)</sup>. Alloxan is an agent considered to have a specific cytotoxic effect on the beta-cells of islets of Langerhans in pancreas . It has been widely used experimentally for the induction of diabetes<sup>(7,8,9)</sup>. In addition , alloxan was found to cause renal damage.<sup>(10)</sup> The toxic effect of streptozotocine on seminiferous tubules of testes had been thoroughly studied<sup>(6)</sup>. Yet , no such studies had been done to throw a light on the toxic effect of alloxan on the testicular tissue .

**Cinnamon** ( *Cinnamomum Zeylanicum*) is one of the common herbs that is cultivated in various area of the world and used for many purposes . It's main components are essential oil , cinnamaldehyde , eugenol , transcinnamic acid , phenolic compounds ....etc<sup>(11)</sup>. It has many

therapeutic uses such as treatment of anorexia , as antifungal , antibacterial , to reduce blood pressure , for digestive disorder etc....<sup>(12)</sup>.

Besides, many researches revealed that cinnamon extracts play an important role in improving glucose and insulin metabolism<sup>(13,14)</sup>.

Therefore, it is of great benefit in the treatment of diabetes<sup>(15)</sup>. The **aim** of this research is to study the effect of alloxan on the testis ( specially seminiferous tubules) and the interaction between alloxan and cinnamon and their effect on testis .

### MATERIALS AND METHODS :

A total of 46 male albino rats ( *Rattus Norvegicus*) , of 10 weeks old ,

200 -350 gms weight , were used.

They were bred in the animal breeding center , College of medicine , University of Baghdad , given food , tap water , and exposed to normal light . Animals were divided into 3 groups as shown in the following table :

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University of Baghdad

Table I : Showing animal groups with their treatment and date of testis removal

Group	Numbers of Animals	Treatment Received	Date of removal of Testis
I	6	Intraperitoneal Infusion of 5 ml Distilled water	2 Weeks after treated
II	20	Treated with Intraperitoneal Alloxan*	(7 animals), 1 week after treated (7 animals), 2 Weeks after treated (6 animals), 3 Weeks after treated
III	20	Treated with Intraperitoneal Alloxan + Cinnamon**	(7 animals), 1 week after treated (7 animals), 2 week after treated (6animals), 3 week after treated

\*Alloxan was given as a single dose (100 mg / kg body weight) <sup>(16, 17)</sup>

\*\* Cinnamon oil ( Sigma chemical Co., USA ) was given orally as a single dose / day ( 0.2 ml / kg body weight ) through orogastric tube <sup>(18)</sup>, for I wk. , 2 wks. & 3 wks. duration, according to groups designed for obtaining the testis .

Alloxan monohydrate 98% ( 2,4,5,6 (1 H, 3 H ) pyrimidin eletrone , molecular weight 160.09 , melting point 255 <sup>0</sup> C, BDH chemicals Ltd ., England) was dissolved in distilled water immediately before use , then injected intraperitoneally over a period of 10 min.

Testis was removed from anaesthetized animal ( with 0.06 ml /gm Nembutal solution ) ( S.Sn.A.La Ballaslere .33501Libourne cedex , France ) after I wk. ,2 wks , and 3 wks . Body weight of rat was examined before and after treatment . Each testis was examined macroscopically and microscopically following this procedure :

For all groups testis was fixed in 10 % formalin for 24 hours <sup>( 19 )</sup> ,washed with tap water , dehydration using graded ethyl alcohol ( 50 % , 70 % , 80 % , 90 % , 100 % twice ) , cleared in xylene , embedded in paraffin wax for 2 hr. ( 3 changes ) , blocked and sectioned into 4-5 micron thick . Each sections had been stained using Harris heamatoxilin & eosin staining <sup>(20)</sup>, and examined with light microscope .

**RESULTS :**

Macroscopically , the testis weight of group II revealed significant reduce in weight , as compared with those of group I and III

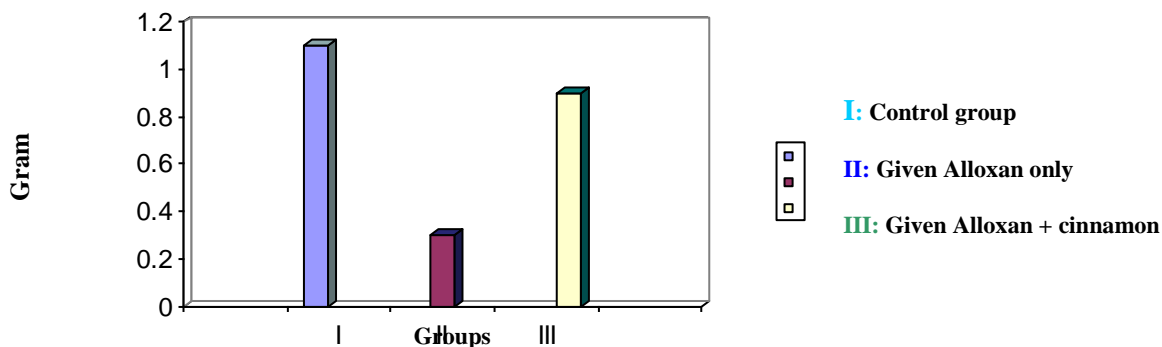


Figure 1 : Showing the mean of testis weight in control and experimental groups

**Microscopic examination :**

Control animals ( group I ) showed seminiferous tubules with adequate germ cells with all stages of maturation , it's wall revealed 4-5 cells thick representing all stages of spermatogenesis( i.e. functional spermatogonia till sperm formation ) .the lumen of the seminiferous tubules was filled with spermatozoa (Fig 2 ) .

Regarding diabetic rats ( group II ) elicited obvious reduction in the number of seminiferous tubules ( Fig 3 ) which are widely separated from each other , no interstitial tissue could be elicited , spermatogenesis cells irregularly arranged and showed 2-3 cells thick .

The cells elicited pyknotic nuclei with ill defined membrane , the lumen showed complete absence of spermatozoa .In contrary , group III (Alloxan + cinnamon ) revealed the same picture that of control group ( Fig 4 ) .

**DISCUSSION :**

The results of this study revealed that the alloxan had a destructive effect on seminiferous tubule cells in the testis of rats .

In alloxan diabetic rats , these tubules were dilated and the spermatogenic cells irregularly arranged , spermatogenesis was arrested with highly reduction in the number of spermatides and spermatozoa could not be observed ( Fig 5 ) .

In our review of literature, we did not find any research about the effect of alloxan on the testis of rat ( Medline 1965 – 2006 ) .

It is well known that alloxan is a beta – cytotoxic agent of pancreas , so used widely to induced

diabetes in laboratory animals . It is clear that diabetes could cause destruction of testis through its metabolism effect<sup>(6)</sup> .

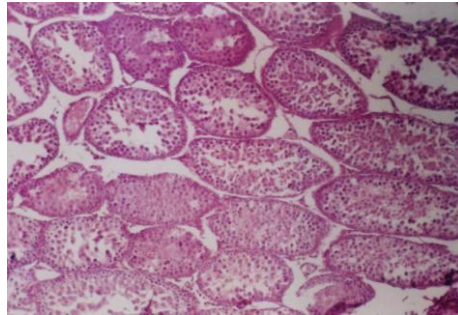
Therefore , the destructive effect of alloxan on seminiferous tubules could be explained either , through its direct toxic effect , due to decreased level of serum testosterone<sup>( 21 )</sup> on seminiferous tubules diameter , vascularization and the number stages in the spermatogenic cycle<sup>( 22 )</sup> , or through indirect action of alloxan on the sexual activity by the effect of nervous system structures such as the hypothalamus and hypophysis .

Furthermore , the reduction of the weight of the sex gland<sup>(23)</sup> , steroidogenic activity and spermatogenesis reported to be the result of the change in the rate of secretion of gonadotrophins as well as the diminution of fertility and sexual behavior in diabetic rats<sup>(22)</sup> .

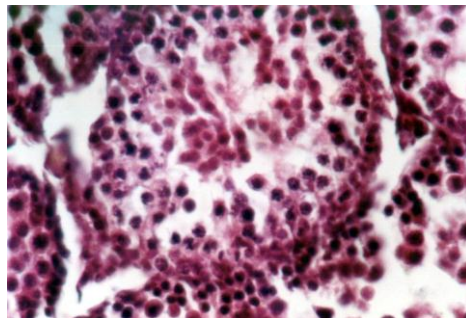
Another new finding could be elicited in this study is the protection of testis by the herb ( cinnamon ) from the destruction role of alloxan . This could be explained either by the direct toxic effect on many organ as pancreas<sup>( 24 )</sup> kidney<sup>( 25 )</sup> and so on testis as well , or could be due to indirect effect through diabetic effect on metabolic changes on seminiferous tubules<sup>(26)</sup> .

**CONCLUSION :**

from the previous mentioned results , it is so clear that cinnamon could be used as a protection against destructive effect of alloxan on testis .

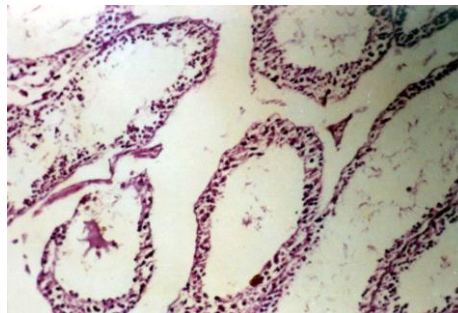


X100

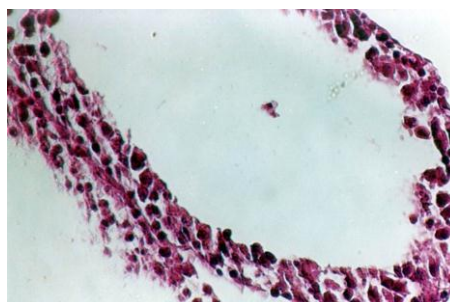


X400

Figure 2 : Showing seminiferous tubules filled with spermatozoa in control rat .

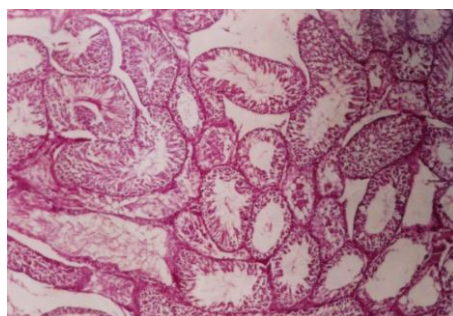


X100

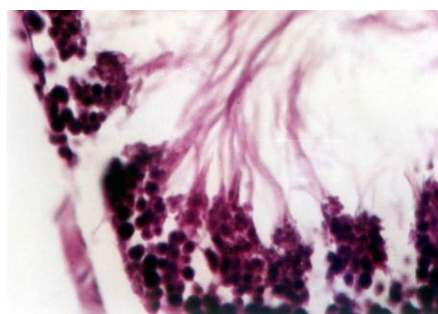


X400

Figure 3 : Testis tissue revealed degeneration of seminiferous tubules , notice the 2- 3 rows of cell membrane , in alloxan – treated rat



X100



X400

**Figure 4: Seminiferous tubules elicited normal picture, and well defined spermatozoa in their lumen .**

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