Research Article

# Antioxidant Effects of CinnamonSupplementation in Ratte Strain WistarwithStreptozotocin-Induced Diabetes

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**Received:** 29-05-2017; **Revised:** 15-07-2017; **Accepted:** 11-08-2017.

**ABSTRACT**

Our problem is to evaluate the behavioral effects of infection and combination diabetes - infection in pregnant rats and the protective effect of an antioxidant on neurobehavioral alterations and complications. Diabetes was induced by a single intraperitoneal injection of streptozotocin (STZ) at a dose of 45 mg / kg. Cinnamon has long been used as a herbal medicine in Asia, a natural plants was administered orally (gavages) at a dose of 2g / kg. This administration reduces anxiety and reduces damage due to hyperglycemia.

The results indicate the ability of cinnamon to prevent changes induced by experimental diabetes.

**Keywords:** Diabetes, Behavioral, Anxiety, cinnamon, Open Field, ACTH.

## INTRODUCTION

Diabetes mellitus type 1 is a common disease that affects individuals predisposed to develop at an early age an autoimmune reaction against pancreatic islet B cells [1]. It is one of the inevitable consequences, a disorder in the regulation of carbohydrate metabolism to a possibility of screening for psychiatric disorders such as depression, anxiety and behavioral problems [2]. Streptozotocin induces diabetes mellitus and diabetic causes installation syndrome characterized by polyphagia, polyuria, polydipsia, and glucosuria [3, 4]. STZ is a reference substance for the experimental study of diabetes [5, 3]. This endocrine disorder is characterized by the destruction of β cells Langerhans responsible for insulin deficiency [6]. Diabetologists have obviously deduced that a complementary therapy consisting of plant extracts is required to optimize the treatment of diabetes [7, 8, 9 ].Cinnamon has long been used as a herbal medicine in Asia, whereas it is known mainly as a spice in Western countries. Several *in vitro* and animal studies published since 1990 have indicated that cinnamon may mimic insulin effects and thus may improve glucose utilization [10, 11].In this context, we have developed an experimental approach that aims to study the antioxidant power of cinnamon and its impact on neurobehavioral alterations and complications on the emotional state announced by the (Open Field) behavioral test and reports about Adrenocorticotropic Hormone (ACTH).

## MATERIALS AND METHODS

### Animals

The biological material base that we have chosen is the rat Rattusrattus of the Wistar strain from Pasteur Institute in Algiers. The rats are nocturnal mammals of the order of rodents. Upon their arrival, the rats weighed an average of 180 grams, and at the time of the experiment, they weighed on average 250 ± 20 grams. The rats were acclimated under standardized conditions of natural photoperiod, an average temperature of 22 ± 4 º C and humidity of 50-70%. After an adaptation period of three weeks , we have selected 25 females based on weight which we separated into four experimental groups each include five rats vehicle control CV lot , lot control treated cinnamon CC Lot diabetic vehicle DV lot diabetic treated cinnamon DC .

### Treatment of Animals

### Administration of streptozotocin

Streptozotocin (STZ) is a chemical commonly used in animal models for the study of diabetes [12]. Diabetes was induced in rats by intraperitoneal injection of STZ (Sigma Lowis ST, Mo) at a dose of 45 mg / kg body weight [13] dissolved in a 0.1M sodium citrate buffer pH 4.5.

### Administration of cinnamon

Administration is by gastric gavages of rats to a high dose of 2g / kg body weight. Treatment with vehicle or the antioxidant Nacl for controls begins 72 hours after the induction of diabetes and it is for 21 days.

### The test of open field (Open Field, OF)

The OF test, first described by Hall in 1934[14], the device is a Plexiglas platform (70cm x 70cm x 40cm) divided into central and peripheral area. Each rat was placed individually in the center of the floor for 5 minutes and allowed exploration [15]. An animal considered anxiety will tend to prefer the peripheral zone Parameters measured

the time spent in the center , time spent in the periphery and the distance traveled.

### Determination of ACTH levels in plasma

This test is realized in plasma on immune metrique sequentiel chimiluminescent phase solid [16].

The solid phase is a covered ball of murinemonoclonal ant ibody anti ACTH. The liquid phaseis the alkaline phosphat ase (an enzyme whichamplifies the chimiluminescence for the antigendetection) combined with an antibody polyclo nal ofdoe anti ACTH in reagent ACTH.

### Statistical analysis of results

Results are presented as mean ± SEM and shown in histograms. A comparison test was used medium. The test T of Student with the MINITAB program for comparing two averages.

## RESULTS

### Variation of the open Field Test parameters

Figure 1 shows that the distance traveled by the control and diabetic rats treated with cinnamon was significant (P< 0.05) than that traversed by the vehicle control rats

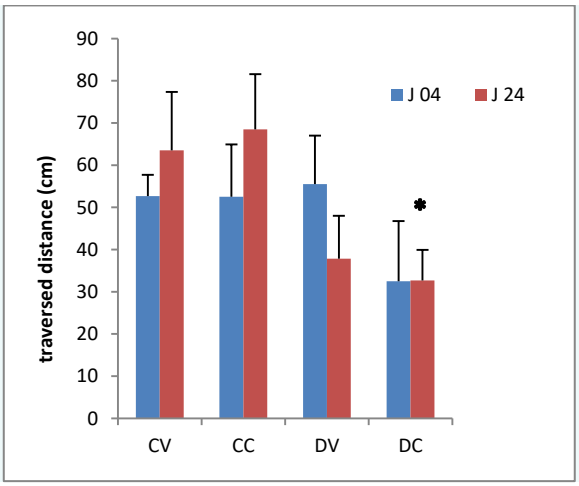


**Figure 1:** Behavior of pregnant rats in the control and treated open Field. (The distance traveled)

### Variation of ACTH levels

The level of ACTH plasmatic in diabetic rats was significant ( P< 0.05 ) contribution to the controls.

The results showed a significant (P< 0.05) in level of ACTH plasmatic in diabetic rats treated with cinnamon contribution to the diabetic vehicle . (DC : 265,27±86,91) vs (DV : 110,17±119,81)

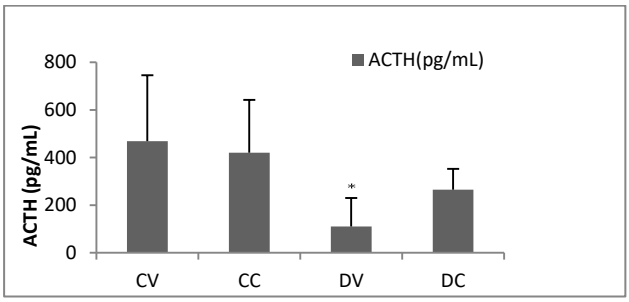


**Figure 2:** Variation of ACTH levels

## DISCUSSION

Our experimental study focused on properties that potentiate cinnamon fight against neurobehavioral alalterations in rats of Wistar diabetic. Recently, hypoglycemic agents products derived from plants have attracted the attention of researchers since natural plant sources are usually considered less toxic by contribution to synthetic sources [9]. The experimental streptozotocin-induced diabetes is characterized by hyperglycemia [4]. Which is linked by several studies to defects in insulin secretion by reducing the mass of β cells of Langerhans islets [17, 18, 19, 20]. It activates the expression of protein kinase C, protein responsible for the dephosphorylation of the insulin receptor [21]. These complications associated with diabetes status seem to negatively affect the browser behavior and anxious state of diabetic rats at of whose comparison with the control group reported persistent and acute locomotor hypoactivity represented by a decrease in the distance [22]. The results of our work mention a hierarchical efficiency of cinnamon against different levels of disorders caused by the disease, and it will intervene at the molecular and cellular level by correcting the hyperglycemic diabetic rats treated status because it has anti-diabetogenic property, insulin-like [23]. Our results have showed a decrease significant of ACTH plasmatic in diabetic rats vehicle contribution to the controls vehicle. Repetto et *al.,* he demonstrated that the experimental diabete has been accompanied by a decrease in level of ACTH.

## CONCLUSION

The crucial problem is summarized in the fact that the induction of experimental diabetes mellitus streptozotocin causes complications and neurobehavioral disruption maternal plasma biochemical metabolism and causes of anxiety. The administration of cinnamon with a protective effect against anxiety and depressive disorders in rats Wistar diabetic. Treatment with cinnamon seem store the levels of ACTH; this suggests that it also has an antioxidant effect.

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**Source of Support:** Nil, **Conflict of Interest:** None.