

## Evaluation of Anti-Diabetic Effect of Cinnamon in Patients with Diabetes Mellitus Type II in Kerbala City

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### Abstract

Type 2 diabetes is the most common form and is characterized by the failure of cells to recognize and respond to insulin which is if not treated accurately, many complication almost always will occur (include cardiovascular, neurological and many others). This study aims to determine the hypoglycemic effect of cinnamon (a kind of spices used for food in eastern and middle-east countries) in patients with type II DM as adjuvant therapy. Forty male patient of age ranging from 35-61 years old with type II DM (poorly controlled on oral anti-diabetic drugs) were clinical assigned for this study. The results revealed that cinnamon has a significant anti-diabetic effect in reduction of FBS, RBS and HbA1c with less extent effect on body weight reduction at  $p$  value  $<0.01$ .

**Keywords:** Cinnamon, Type II DM, FBS, RBS, HbA1c.

### 1. Introduction

Diabetes is the most common endocrine disease and still a serious health problem all over the world. According to the 2005 prevalence data, approximately 7.3% of the U.S. adult population is diagnosed with diabetes (Ziegenfuss, et al., 2006). Prevalence of diabetes in Iraq-Basrah was estimated to be 7.43% (Mansour, et al., 2008) and disease prevails in both genders and all age groups, so the general public has a concern about its control and treatment. Diet can play a major role in the incidence and progression of the disease (Gorman and Krook, 2011). Many medical therapeutic strategies are used for effective lowering glucose level in these patients such as (secretagogues as Sulfonylurea drugs and Glinides, insulin sensitizer like Biguanides and glitazones,  $\alpha$ -glucosidase inhibitors, drugs inhibit the enzyme dipeptidyl peptidase – IV, and incretin mimetics) (Alberti and Zimmet, 1998).

Currently, there is growing interest in herbal remedies like cinnamon due to the side effects associated with the therapeutic agents (Anderson et al., 2006). Cinnamon has been shown to be generally safe when ingested and to have many pharmacological properties, such as antioxidants activity, natural insulin sensitizer and antibacterial effects (Lopez et al., 2005). Several in vitro and in vivo studies have shown cinnamon's effect on insulin signal transduction and demonstrating the reducing effect on the mean fasting serum glucose, triglyceride, LDL cholesterol, and total cholesterol levels (Khan et al., 2003). Cinnamon is derived from the inner bark of Cinnamomum trees, and has a long history as a culinary and medicinal plant. Its uses in traditional medicine include the treatment of colds, congestion and diarrhea, and modern science has found that it is high in antioxidants that may help reduce the risk of chronic diseases and slow the progress of aging. More specifically, the spice appears promising in the fight against diabetes. "Cinnamon bark actually contains calcium, chromium, copper, iodine, iron, manganese, phosphorus, potassium, zinc, and vitamins A, B1, B2, and C, many of which are important for the prevention or treatment of diabetes (David Gutierrez, 2011 Personal communication).

### 2. Methods and Patients:

A forty known cases of male patient with DM II of 35-61 years old who were taking an oral anti-diabetic drug(s) were selected randomly for this study. They were given a crude grind cinnamon (0.5 gm. after each meal by 15 minutes) for 3 subsequent months without interruption of cinnamon administration. Before giving cinnamon, RBS, FBS, HbA1c, and body weight were measured as a base line values. After the treatment, these parameters were again measured to evaluate if there is significant effect of the proposal herb on them or not.

#### 2.1 Statistical analyses:

Statistical analysis was performed by using SPSS (version 20) and paired  $t$  test was used to determine statistical significance at  $p$  value  $<0.01$ .

### 3. Results:

Table (1) shows the study results and are expressed as the mean + SD at  $p$  value  $<0.01$ .

#### 4. Discussion:

Diabetes mellitus is becoming a major public health problem worldwide, including in the WHO Eastern Mediterranean region. Due to the lack of physical activity as well as dietary changes, the incidence of diabetes is increasing at an alarming rate. Diabetes affects more than 230 million people worldwide. If the current trend continues, 370 million people worldwide are expected to have diabetes by the year 2030 (Rudkowska 2009, WHO 2006). Many researches involve the using of herbal substances that may be alternative to current oral therapy for DM II which are safer, with less cost and effective. In this study, cinnamon was used and different parameters was assessed for determination of its effect on blood sugar and the following results were obtained.

##### 4.1 Effect of cinnamon on FBS:

A significant reduction of mean FBS was observed after 90 days of using cinnamon in comparison to the base line reading (174.70 +19.83 to 126.25+ 17.85 respectively) by about 27.5%. cinnamon requires sufficient Insulin producing cells to be functioning and the stimulation of insulin release could be responsible for most of the metabolic effects (Villasenor et al., 2004). The suggested mechanisms of action of cinnamon include delayed gastric emptying (Hlebowicz et al., 2007), increased glycogen synthesis by activating glycogen synthase and inhibiting glycogen synthase kinase 3b, and reduced glucoseabsorption in the small intestine through increased glucosidase enzymes and inhibition of intestinal ATPase (Solomon and Blannin, 2007).

##### 4.2 Effect of cinnamon on RBS:

Although the level of significance is less than that for FBS reduction, but statistically, it is still significant (276.88 + 48.57 to 208.30 + 28.77) by about 24%. This finding suggest that cinnamon is promising herbal therapy that, may in future, substitute some anti- diabetic drugs as it is mentioned by Broadhurst et al (2000).

##### 4.3 Effect of cinnamon on HbA1c:

As a consequence of reduction of both RBS and FBS, a better control of blood sugar lead to improvement in Hb A1C level to be minimized normal or near normal. These date was significant at p value < 0.01 which is parallel to Akilen et al (2011).

##### 4.4 Effect of cinnamon on body weight:

In spite of that many researchers concluded that cinnamon reduces body weight as a mechanism of its anti-diabetes action No statistical significance was observed on reduction of body weight when cinnamon was used.

Cinnamon has even outperformed pharmaceuticals. In a study published in the "Journal of Diabetic Medicine," participants given cinnamon supplements experienced greater improvement in blood sugar levels than participants given standard diabetes drugs. Even for those interested in pursuing cinnamon supplementation, the best way to prevent and manage Type 2 diabetes is still to maintain a healthy body weight, eat a healthy diet low in refined sugar and high in natural fiber, and exercise regularly.

#### References:

- Ziegenfuss TN, Hofheins JE, Mendel RW, Landis J, Anderson RA, (2006), Effects of a Water-Soluble Cinnamon Extract on Body Composition and Features of the Metabolic Syndrome in Pre- Diabetic Men and Women. *J Int Soc Sports Nutr.* 3(2): 45–53.
- Mansour AA, Wanoose HL, Hani I, Abed-Alzahrea A, Wanoose HL (2008), Diabetes screening in Basrah, Iraq: a population-based cross-sectional study. *Diabetes Res Clin Pract.*;79(1):147-50.
- Gorman, DJ; Krook, A (2011), Exercise and the treatment of diabetes and obesity". *The Medical clinics of North America*, (5): 953–69.
- Alberti KG, Zimmet PZ (1998), Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: diagnosis and classification of diabetes mellitus provisional report of a WHO consultation. *Diabet Med.* 15(7):539-53.
- Anderson RA, Broadhurst CL, and Polansky MM (2006), Isolation and characterization of chalcone polymers from cinnamon with insulinlike biological activities. *American Journal of Clinical Nutrition* 84 (3): 1432-1436.
- Lopez P, Sanchez C, Batlle R, and Nerin C (2005), Solid- and vapor- phase antimicrobial activities of six essential oils: susceptibility of selected food borne bacterial and fungal strains. *J. Agric Food Chem.*; 53: 6939-6946.
- Khan A, Safdar M, Khan MMA, Khattak KN, Anderson RA.( 2003),Cinnamon improves glucose and lipids of people with type 2 diabetes. *Diabetes Care* 26:3215–3218.
- Rudkowska, I.( 2009), 'Review: functional foods for health: focus on diabetes, *Maturitas* Vol. 62, pp.263–269.
- Villasenor, I.M., Canlas, A.P., Faustino, K.M. and Plana, K.G.( 2004), 'Evaluation of the bioactivity of triterpene mixture isolation from *Carmona retusa* (Vahl.) Masam leaves', *Journal of Ethnopharmacology*, Vol. 92, pp.53–56.

- Hlebowicz J, Darwiche G, Bjorgell O, Almer LO (2007), Effect of cinnamon on postprandial blood glucose, gastric emptying, and satiety in healthy subjects. *Am. J Clin Nutr* 85: 1552–1556.
- Solomon TP, Blannin AK (2007), Effects of short-term cinnamon ingestion on in vivo glucose tolerance. *Diabetes Obes Metab.* 9:895–901.
- Broadhurst CL, Polansky MM, Anderson RA (2000), Insulin-like biological activity of culinary and medicinal plant aqueous extracts in vitro. *J Agric Food Chem.* 48:849–52.
- Akilen A, Kleefstra N, Logtenberg SJ, Groenier KH, Bilo HJ.: Reply to Akilen et al (2011). Effect of cinnamon on glycated haemoglobin and blood pressure. *Diabet Med.* 380. doi:10.1111/j.146 .

**Table ( 1 )** : Study variables results with statistical significance

<b>Variables</b>	<b>Before treatment</b>	<b>After treatment</b>	<b>Statistical significance</b>
FBS (mean + S.D) (mg/dl)	174.70 + 19.83	126.25 + 17.85	Significant ***
RBS (mean + S.D) (mg/dl)	276.88 + 48.57	208.30 + 28.77	Significant **
B.W (mean + S.D) kg	89.40 + 12.14	89.85 + 21.70	Not significant
HbA1c(mean+ S.D)	9.54 + 0.96	8.22 + 0.65	Significant **