Effects of cinnamon on glucose control in glucose intolerant patients

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Abstract: Background and purpose: According to previous studies, cinnamon may have a positive effect on the glycaemic control and the lipid profile in patients with diabetes mellitus type 2. The aim of this study was to determine whether cinnamon improves fasting plasma glucose and blood sugar. Methods and Materials: We chose 50 volunteer glucose intolerance patients (28 female & 22male) as the study samples with cross sectional sampling method .The study samples were in 54.74 +_7.10 years age group(Mean+_ Standard deviation) ,underwent a three phase Oral Glucose Tolerance Test(OGTT) supplemented with either a 5g placebo (control OGTT),5g cinnamon (Cinnamon OGTT)in second phase ,and 5g cinnamon 12 hours before OGTT (OGTT 12 hours before)in third phase. .Findings :Cinnamon ingestion along with oral glucose solution and also 12 hours before the test ,caused reduction in blood glucose level of the samples ($p<0.001$) ,but it had not any effect on their fasting blood sugar ($p<0.831$). Conclusion: This study revealed that cinnamon spices supplementation causes blood glucose control, and not only are its effects immediate, they also appear to be sustained for 12 h.
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1. Introduction

Type 2 diabetes is the most common metabolic disease worldwide, with a prevalence estimated to rise from 171 million in 2000 to 366 million in 2030(1).Although the cause of type 2 diabetes appears to be multifactorial, it has been established that diet can play a major role in the incidence and progression of the disease (2).In addition to drug treatment, dietary interventions were shown to represent an effective tool to prevent and treat insulin resistance or type 2 diabetes (3, 4).

The first clinical trial to evaluate the effect of cinnamon in individuals with type 2 diabetic was conducted in Pakistan (5).It showed that cinnamon powder taken over a 40-day period reduced mean fasting serum glucose (18-29%), triglyceride (23-30%), LDL cholesterol (7-27%), and total cholesterol (12-26%) levels. Three different doses of cinnamon were administered: 1, 3, and 6 g daily. All were equally effective. These findings led to widespread cinnamon use.

2. Methods and materials:

Fifty glucose intolerant patients [22 M, 28F; age: 54.74.±7.10y; body mass index (BMI; in kg/m²):31/88±4.05 (range: 25.5-39.5)] were recruited from Firoozgar endocrine institute. All volunteers were assessed by a general health questionnaire and provided informed written consent prior to commencing the study. The trial took place in the Firoozgar laboratory in the Firoozgar endocrine institute, and participants had to make three visits to the laboratory, with each visit separated by at least 5 days. A full dietary record was taken for the 2 days preceding the first test , and subjects were instructed to refrain from consuming alcohol, caffeine and cinnamon products , and from non-habitual exercise for 48 h prior to each trial . Each subject completed three interventions in a cross-sectional design: a control oral glucose tolerance test, an OGTT supplemented with cinnamon and an OGTT cinnamon ingested 12 h before the trial. Study samples were not use anti hyperglycemic agents, they were not affected by renal and liver diseases and all of them filled and signed the consent forms .Each of the samples excluded from the study in the case of immigration or being affected by Diabetes Mellitus. Following an overnight fast in the first stage subjects arrived in the laboratory and fasting blood sample was taken OGTT commenced; subjects were instructed to ingest a 75 g of dextrose in 300 ml of water. After that again blood sample was taken 2 h following OGTT. All volunteers were administered 5 g of wheat rice placebo capsules to consume 12 h prior to, and immediately prior to the OGTT. At the end the subjects were instructed to come back to the laboratory in 5 days, following their dietary intake record. In the second stage subjects followed the same protocol that was mentioned in the first stage, however, 5 g of cinnamon capsules was ingested with the oral glucose. Also, they were given 5 g of wheat rice placebo capsules to consume 12 h prior to OGTT

(12 hours before the test). The dietary intake was described above, and the blood sample was taken n the same manner. A 5 g cinnamon was chosen based on an average of Khan's evidence. In the third stage again the same protocol was followed as for the first stage, although subjects were given5 g of cinnamon capsules12 h prior to OGTT the previous evening. Also, 5 g of wheat rice placebo capsules were ingested with the OGTT. Again dietary intake were followed as described and blood sample was taken as mentioned. The spss 15 statistical software was used for documenting the data and analyzed through descriptive statistics and intergroup ANOVA with repeated measurements of paired t test.

3. Findings:

Among 50 patients chosen as the study samples, 49 subjects continued their cooperation. One of the female patients excluded from the study because of having Diabetes mellitus. Mean fasting blood sugar of the study samples didn't show a significant difference in 3 stages. In contrast glucose tolerance tests of the patients in three stages had a significant relationship ($p<0.001$). Also in paired by paired comparison of different stages of glucose tolerance test with each other, we concluded that mean tolerance tests were significant in second and third stages, but in the second stage further reduction in blood sugar levels compared to the third stage can be seen ($p<0.001$). It should be noted that after repeated measurements, in double by double comparison of paired t we considered Bonferoni correction in a significant level (0.017=0.5.3).

Table 1- The mean FBS and GTT of the samples in different stages of intervention in patients referring to endocrinological clinic of firozgar hospital.

blood sugar in different stages	**mean**	**standard Deviation**	paired t test
fasting blood sugar in first stage fasting blood sugar in third stage	111.68 111.67	**7.23** **6.47**	**t:0.27 df:48** **Pvalue:0.785**
glucose tolerance test in first stage glucose tolerance test in second stage	**171.74** **137.04**	**14.05** **13.64**	**t:13.72 df:49** **Pvalue:0.000**
glucose tolerance test in first stage glucose tolerance test in third stage	**172.22** **154.24**	**77.13** **15.06**	**t:7.76 df:48** **Pvalue:0.001**
glucose tolerance test in second stage glucose tolerance test in third stage	**136.78** **154.24**	**13.65** **15.06**	**t:-7.129 df:48** **Pvalue:0.001**

4. Discussions:

To our knowledge this is the first study evaluating the short-term effect of cinnamon on fasting plasma glucose and OGTT in glucose intolerant patients. The study findings showed that a single ingestion of cinnamon can reduce blood glucose which remains 12 hours after its consumption. In this study, we observed that cinnamon has no effect on fasting blood sugar of the patient s with glucose intolerance, in contrast it causes reduction of blood glucose while doing glucose tolerance test. Subjects can not distinguish cinnamon capsules from placebo, and did not report any problem with capsule ingestion. Also in this study there wasn't a significant relation between the blood glucose and variables such as gender, age, blood pressure level and positive family history of Diabetes. Changes in proportion of combination of cinnamon essence, the length of plant's survival and the time period between its harvesting and the time of receiving by consumers were the limitations of this study , which chemically analyzing of the cinnamon was carried out to determination of its consistency. Lack of trust in consuming capsules among subjects and their transportation problems were other limitations of the study.

Khan et al. (6) were the first to report that cinnamon enhances glucose uptake in a rat epididymal fat cell assay. Thereafter, others confirmed the insulin-potentiating properties of cinnamon on glucose uptake (7). They (8) presented the first data on the effect of cinnamon supplementation in vivo in humans. In their study, 10 patients with type 2 diabetes (aged52.2±6.3y) consumed 1,3, or 6 g of cinnamon or placebo for a period of 40 d. cinnamon consumption ld to a major reduction in fasting serum glucose (18-29%), triacylglycerol (23-30%), LDL(7-27%), and total cholesterol(12-26%) concentrations in each of the cinnamon supplementation trials.

Solomon and Blanin(9) have done similar research on seven healthy volunteers, aged 26±1 years, body mass index 24.5±0.3kg/m², and they concluded similar results as we did .

In conclusion, our study showed that the intake of cinnamon can reduce serum glucose in glucose intolerant patients, however further investigation is required to validate its use as theraputic agent for glucose tolerance.

References:

1. Wild s,Roglic G, Green A, Sicree R,King H.Global prevalence of diabetes :estimates for the year 2000and projections for 2030.diabetes care .2004;27:1047-53
2. Carter JS, Pugh JA, Monterrosa A. Non-insulin-dependent diabetes mellitus in minorities in the united states .Ann intern Med.1996;125:221-32
3. Jenkins DJ, Kendall CW, Augustin Ls, Franseschi S, Hamidi M, Marchie A, Jenkins AL, axelsen M.Glycemic index:overview of implications in health and disease.Am J Clin Nuttr.2007;76:266S-73.
4. Willett W, Manson J, Liu S. Glycemic index, Glycemic load, and risk of type 2 diabetes. Am J Clin Nutr.2002;76:274S-80.
5. Blevins Steve M, leyva Misti J, Brown Jashua, WRIRHT Jonelle, Scofield Robert H, Aston Christopher E. Effect of cinnamon on glucose and lipid levels in non-insulin-dependent type 2 diabetes. diabetesjournal.2007;30: 2236-7.
6. Khan A, Bryden NA, Polansky MM, Anderson RA. Insulin potentiating factor and chromium content of selected foods and spices. Biol Trace Elem Res.1990;24:183-8
7. Broadhurst CL, Polansky MM, Anderson RA. Insulin-like biological activity of culinary and medicinal plant aqueous extracts in vitro. J AGRIC Food Chem.2000; 48: 849-52.
8. Khan A, Safdar M, Ali Khan MM, Khattak KN, Anderson RA. cinnamon improves glucose and lipids of people with type 2 diabetes. Diabetes care. 2003; 26 : 3215-8.
9. Solomon T. P. J., Blanin A. K. . Effects of short-term cinnamon ingestion on in vivo glucose tolerance. Diabetes,Obesity and Metabolism Journal Compilation.2007;9:895-901.

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