



The Effect of Cinnamon on Glucose of Type II Diabetes Patients

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ABSTRACT

The incidence of type II diabetes is increasing across the world. Dietary modifications help the patients to control blood glucose. Traditional herbs and spices are commonly used for control of glucose among which cinnamon (肉桂 Ròu Gui; *Cinnamomum cassia*) has the greatest effect. Research has shown that adding cinnamon to diet can help to lower the glucose level. The aim of this study was to determine the effect of cinnamon on the glucose level in blood. This was a Randomized clinical trial in which 70 Patients with type II diabetes were assigned randomly two groups (35 in cinnamon and 35 in placebo group). The groups were matched in terms of body mass index (BMI), HbA1c and fasting blood sugar (FBS). Patients were treated with cinnamon and the placebo group was treated with placebo in addition to their routine treatment for 60 days. FBG levels and glycosylated hemoglobin of patients on the first day, and 1 and 2 months after treatment were measured. Data were analyzed using *t*-test and paired *t*-test in Statistical Package for the Social Sciences (SPSS).16 software. The mean levels of FBS before, and 1 and 2 months after the intervention were 174 ± 59 , 169 ± 43 and 177 ± 45 ; respectively. The levels of HbA1c before and after the intervention in the cinnamon group were $(8.9 \pm 1.7$ and $8.9 \pm 1.6)$. There was no significant difference in FBS and glycosylated hemoglobin levels between the two groups ($P = 0.738$ and $P = 0.87$, respectively). Results showed that using certain amount of cinnamon for 60 days did not change the glucose level of diabetic patients. So, using cinnamon to type II diabetes patients cannot be recommended and more studies are needed in future.

Key words: Cinnamon, Diabetes, Fasting blood sugar, Herbal medicine

INTRODUCTION

Prevalence of diabetes type II was increasing across the world. Studies showed that more than 220 million suffer from diabetes worldwide.^[1] The WHO report in the year 2000, put the estimates at 171 million. Which is expected to rise to 366 million in 2030.^[2,3] Diabetes mellitus is a chronic disorder of glucose metabolism resulting

from dysfunction of pancreatic beta cells and insulin resistance. It is still a serious global health problem. The disease prevails in both genders and all age groups, so there is concern among the general public about its control and treatment. The therapeutic goal of diabetes control is reaching the normal level of blood glucose without hypoglycemia and without causing any disturbance in the daily life activities of patients. In type II diabetes, if the fasting blood sugar

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(FBS) cannot be controlled by diet, oral drugs are used for the control of blood glucose which is associated with side effects resulting from long-term drug use.^[4] Using complementary medicine among patients with diabetes is different but the major therapies used among the patients are nutritional supplements, herbal medicines, spiritual therapies, relaxation techniques and Yoga.^[5] Studies showed that most of the diabetic patients use herbal medicines more than the other supplemental therapies because they believe that herbal medicines are natural, and healthy, whereas in poor quality and with improper use, they can be harmful and cause adverse effects.^[6,7] Many studies confirmed that complementary medicine could be effective for diabetic patients they cause decrease in blood glucose levels by different mechanisms that could be helpful in patients' care and for their better quality of life.^[8]

Studies showed that spices such as cinnamon (肉桂 Ròu Gui; *Cinnamomum cassia*), and carnation, walnut, green tea, and mint have similar effects on insulin action and the most active of them is cinnamon.^[6] Cinnamon is the most bioactive product.

Cinnamon is commonly used as a spice across the world and in Iran, its solution is used which is not toxic.^[9] Several studies have been conducted to confirm the effect of cinnamon on decreasing the blood glucose of diabetic patients.^[10] Khan^[11] and Crawford^[12] showed that cinnamon has anti-diabetic effect, but Steve Blevins^[13] was not in agreement on the effect of cinnamon. In this respect, no study has been conducted in Iran on human subjects. Gheibi and Parvizi (2005) performed their study on rats and showed that cinnamon could decrease blood glucose in diabetes.^[10] Therefore, keeping in mind the controversy on the effect of cinnamon in decreasing the blood glucose and due to the widespread use of cinnamon among Iranian people, this study was designed to see the effect of cinnamon on blood glucose in Type II diabetic individuals.

MATERIALS AND METHODS

Subjects

This study was a double blind randomized clinical trial that was done to determine the effect of cinnamon on the blood glucose of patients with diabetes type II in Mashhad. Samples were selected randomly and assigned to two groups of treatment and placebo. The study tools included demographic data, biochemistry auto analyzer, Pars Azmoon glucose kit and Bio-system kit. Validity of demographic form was confirmed by content validity and the other instruments used for measurement of blood glucose and glycosylated hemoglobin were valid. To determine a power of 0.80, we calculated a sample size of 70, with $\alpha = 0.05$. The sample size in each group was 35 and the study duration was 2 months. The inclusions criteria were: Age > 18 years, no pregnancy, no acute and severe stern in recent 8 weeks, not intake of herbs or other complementary cinnamon in recent 8 weeks, HbA1c > 7, 140 < FBS < 250, no allergy or sensitivity to cinnamon or other foods, no history of hemolytic anemia or hemoglobinopathy, no acute infection (pneumonia, urinary tract infection, otitis) and no insulin therapy.

Study design and dietary intervention

Subjects were selected based on the inclusion criteria among the patients who came to the (Endocrinology and Metabolism Cen-

ter, Mashhad University of Medical Science. The Samples selected and assigned randomly to two groups (treatment and placebo).

We randomized the patients by blocking (a designed technique). Investigators and subjects were blinded to group assignment and to capsule content. Cinnamon and placebo were ground finely and put into capsules which could not be distinguished by color, odor, or taste. Each capsule contained 500 mg product.

After explaining the research objectives to the patients and taking their consent, demographic and related data were collected by interview and using patient's medical file. Then, boxes of A and B that included 60 capsules of cinnamon (*Cinnamomum cassia*) or placebo, prepared by collage of pharmacy, were given to the patients. Patients had to use two capsules after breakfast and dinner with their drugs for first 30 days, then after 8h of fasting, 5 ml of blood was collected for glucose test. Then two capsules were given to patients for use for second 30 days and also, their blood glucose at the end of the second 30 days was evaluated.

Thirty and sixty days after using capsules, necessary information such as change of drugs, cinnamon use, diet change, and Physical Activity was collected for the samples. Medications and diet of subjects were not changed during the study. Researcher used phone call for follow-up to ensure the use of capsules and recorded data about changing drug, diet and physical activity in a checklist. Researcher did not know the contents of the capsules until the end of the sampling and all the experiments were carried out by one laboratory.

Compliance to the supplementation protocol was supervised by a research technician who contacted the subjects once a week. Each subject was required to return the original bottle of their respective supplement for capsule counts and compliance was monitored by counting the unconsumed capsules each week.

Statistical methods and data analysis

Data are presented as Mean \pm SD or percentage. Statistical analyses were performed using Statistical Package for the Social Sciences (SPSS) software (version 11.5). The normal distribution of the variable was checked by Kolmogorov-Smirnov test. Qualitative variables, such as physical activity, were analyzed using Chi-square test. For comparison of variables before and after the intervention within each group, paired *t* test was used. Significant differences between groups were determined by using an independent *t* test. Statistical significance was set at $P < 0.05$.

RESULTS

The sample consisted of 70 Type II diabetes patients di-

Table 1. Baseline characteristics of the study population*

Variable	Cinnamon (n=35)	Placebo (n=36)
Age, years	53.7 \pm 9.7	54.7 \pm 8.1
BMI	27.1 \pm 3.2	28.7 \pm 4
Gender (%)		
Men	34.3 (n=12)	33.3 (n=12)
Women	65.7 (n=23)	66.7 (n=24)

Values are mans \pm SD or percentage; The groups did not differ with respect to any variable, $P > 0.05$, BMI: Body mass index

Table 2. Comparison of means of FBS and HbA1c in patients' before and after the intervention period in the two groups

Variables	Cinnamon group (n=35)			Placebo group (n=36)		
	Before	After (60 days)	Differences	Before	After (60 days)	Differences
FBS	177±45	174±59	3±2.4	159±31	151±38	8±2.8
HbA1c	8.9±1.7	8.9±1.6	0.03±0.01	8.4±1.4	8.3±1.3	1.4±0.18

FBS: Fasting blood sugar; HbA1c: Hemoglobin A1c

vided into two groups (35 cinnamon (肉桂 Ròu Gui; Cinnamomum cassia) and 35 placebos). The mean age of patients was 54.3 ± 8.9 years. Of them, 33.8 % (24) were males and the rest were females. Most of the patients in the groups were housekeepers (65.8% and 58.3%, respectively in cinnamon and placebo groups). The mean of body mass index (BMI) in cinnamon and placebo groups was 27.1 and 28.4, respectively [Table 1]. There was no significant different between FBS and glycosylated hemoglobin in the two groups before the intervention [Table 2]. Results showed that there was no significant difference between the mean of blood glucose in 30 and 60 days after the intervention in the two group ($P > 0.05$) [Table 3]. There was no significant different between FBS and glycosylated hemoglobin in the two groups after the intervention ($P > 0.05$).

DISCUSSION

In this study, the blood glucose of type II diabetes patients did not decreased by using 1 g cinnamon (肉桂 Ròu Gui; Cinnamomum cassia) during 60 days. There was no significant difference in FBS and glycosylated hemoglobin levels before and after the intervention between the two groups. *In vitro* studies have shown that cinnamon extract has increasing effect on Phosphorylation activity of insulin receptors and decreasing effect on tyrosine phosphatase activity, and so, it shows insulin-like properties.^[14] Some studies have shown that cinnamon, like insulin hormone, inhibits glycogen synthase activity.^[15]

Vance Chonbic *et al.*, (2005) studied the effect of cinnamon on blood glucose of 25 type II diabetics during menopause and showed that there was no significant difference in terms of FBS, glycosylated hemoglobin, glucose tolerance test, insulin concentration and serum lipids concentration on using 1.5 g cinnamon for 6 weeks.^[16] Steave Belvin *et al.*, (2007) reported that using cinnamon 1 g daily for 3 month had no significant effect on glucose, lipid, and HbA1c levels in type II diabetics.^[13] Justin *et al.*, (2007) reported that using cinnamon 1 g daily had no significant effect on HbA1c of 72 type I diabetics and the result was similar to that of our study.^[17] Soni *et al.*, (2009) in one study showed that using 2g cinnamon had significant effect on the blood glucose of type II diabetics after 40 days and the findings confirmed that cinnamon is an effective material in decreasing the blood glucose of diabetic patients, which was not similar to our study results.^[16] The difference could be attributed to the fact that in Soni's study, the experimental groups were formed by only males, so probably, hormonal difference and more consumption of cinnamon could be effective in the control of glucose, but it has not been proven yet. Khan *et al.*, studied the effects of 1, 3, and 6 g day of whole cinnamon powder on FBG and serum lipids in 60 people with

Table 3. Comparison of means of FBS in patients' 30 and 60 days after the intervention in the two groups

Variables	Cinnamon	Placebo
FBS after 30 days	169±43	165±36
FBS after 60 days	174±59	164±34

FBS: Fasting blood sugar

poorly controlled type II diabetes from Pakistan. After 40 days of supplementation, FBG decreased by 18-29%, cholesterol by 12-26%, low density lipoprotein (LDL) cholesterol by 7-27%, and triacylglycerol decreased by 23-30%.^[11] The result of our study was not similar with that of Khan and Crawford, as it could be related to the difference in base of FBS, using no standard diet and short duration of intervention compared to the present study.^[11,12] On the other hand, the capsules were packaged in a local store and use these capsules were not controlled in terms of purity. The other weakness of Crawford's study in comparison with our study was lack of placebo group and blindness.

Our study result was similar to those of Justin,^[18] and Steve Blevin but different from the results of Crawford, Khan, and Soni's studies. Comparing the result of this study with those of others and considering their limitations, we can point as the limitations of the present study its duration (8 weeks) and dose of the cinnamon used (1 g per day). There are some studies with longer duration^[19] and it would be better if we could have the possibility for continuing the intervention. Which was impossible because subjects had time limitations to come to the study center (Endocrinology and Metabolism Center, Mashhad University of Medical Sciences) and extension of time would have led to limited compliance. There are some studies that used more than 1 g per day cinnamon and have reported significant effects,^[11] and it would be better if we could have another group with higher dose of cinnamon for comparing the doses, which was impossible because of financial limitations.

CONCLUSION

Taking cinnamon (肉桂 Ròu Gui; Cinnamomum cassia) at a dose of 1 g daily for 30 and 60 days has no effect in decreasing the blood glucose of type II diabetes patients. Based on the controversial information obtained on the effect of cinnamon in decreasing the blood glucose, it can be said that race, life style, BMI, type of drugs, and duration of taking cinnamon influence diabetes treatment. Many studies have been done reporting different results and it seems the effect of cinnamon was different in various populations. The results of this study showed that cinnamon use at the study dose and duration was no effective and it is recommended to perform many studies in future with cinnamon at various doses and treatment duration.

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