

การศึกษาประสิทธิผลของผลิตภัณฑ์เสริมอาหารอบเชยต่อระดับน้ำตาลในเลือดในผู้ที่มีภาวะก่อน
เบาหวาน

The Efficacy of Cinnamon Supplement on Blood Glucose Level in Prediabetes Subjects

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บทคัดย่อ

อบเชยเป็นสมุนไพรที่มีคุณสมบัติในการควบคุมระดับน้ำตาลในเลือด โดยอบเชยมีผลต่อกระบวนการสร้างและสลายน้ำตาลกลูโคส อีกทั้งคุณสมบัติต้านอนุมูลอิสระ ส่งผลให้ลดความเสี่ยงในการเกิดโรคระบบหัวใจ วัตถุประสงค์ของงานวิจัยนี้เพื่อศึกษาประสิทธิผลของผลิตภัณฑ์เสริมอาหารเสริมอบเชยต่อระดับน้ำตาลในเลือดในผู้ที่มีภาวะก่อนเบาหวาน ผู้เข้าร่วมวิจัยถูกแบ่งเป็นสองกลุ่มโดยการสุ่ม ทั้งสองกลุ่มไม่ทราบว่าตัวเองจัดอยู่กลุ่มใด กลุ่มทดลองจะได้รับแคปซูลอบเชยในปริมาณ 1200 มิลลิกรัมต่อวัน โดยแบ่งรับประทานเป็นสามมื้อหลังอาหาร กลุ่มควบคุมจะได้รับยาหลอกในปริมาณและการรับประทานที่เท่ากัน เป็นเวลา 30 วัน ตลอดการวิจัยผู้เข้าร่วมวิจัยจะรับประทานอาหารและออกกำลังกายตามปกติ ผลการทดลองพบว่า เมื่อเปรียบเทียบภายในกลุ่มค่าระดับน้ำตาลในเลือดลดลงอย่างมีนัยสำคัญ ทั้งในกลุ่มทดลองและกลุ่มควบคุม ทั้งนี้เมื่อเปรียบเทียบผลของระดับน้ำตาลในเลือดระหว่างกลุ่มทดลองกับกลุ่มควบคุม ณ วันที่ 30 พบว่าแตกต่างอย่างมีนัยสำคัญ นอกจากนี้เมื่อเปรียบเทียบค่าเฉลี่ยการลดลงของระดับน้ำตาลในเลือดระหว่างกลุ่มทดลองและกลุ่มควบคุม พบว่ามีความแตกต่างอย่างมีนัยสำคัญ ดังนั้นการรับประทาน

ผลิตภัณฑ์เสริมอาหารเสริมอบเชย ปริมาณ 1200 มิลลิกรัมต่อวัน สามารถลดระดับน้ำตาลในเลือด
ในผู้ที่มีภาวะก่อนเบาหวานได้

คำสำคัญ: อบเชย / ระดับน้ำตาลในเลือด / ภาวะก่อนเบาหวาน

The Efficacy of Cinnamon Supplement on Blood Glucose Level in Prediabetes Subjects

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Abstract

Cinnamon (*Cinnamomum verum*) is used as one of the traditional folk herbs for diabetes consider as a herbal food supplement. Cinnamon supplement may influence glucose metabolism and the overall condition of diabetes not only hypoglycemic effect but also improve lipid metabolism, antioxidant status and decrease risk for cardiovascular disease which can promote health benefits. This study was carried out to investigate the efficacy of cinnamon supplement on decrease of blood glucose level in prediabetes subjects, aged 30-50 years, fasting blood glucose level of 100-125 mg/dL at Thachana hospital, Suratthani province. The method was conducted 24 pre-diabetes subjects by randomly drawn to divide into two groups, the treatment group and the control group. Each group was assigned for cinnamon supplement (400 mg/capsule) and placebo after meals three times daily for 30 days. Subjects were advised to maintain normal diet and physical activity during the study. The measurements were taken at day 0 and day 30 for fasting blood glucose level. On the basis of the result, the fasting blood glucose level after taking cinnamon supplement for 30 days was significant decreased in treatment group

($p < 0.05$) from 108.00 ± 5.67 mg/dL to 99.25 ± 5.82 mg/dL. The intergroup differences of average of fasting blood glucose between 2 group was observed at day 30 ($p < 0.05$).

Keywords: Cinnamon/ Blood Glucose Level/ Prediabetes

Introduction

Diabetes is a metabolic disorder, characterized by β -cells of pancreatic dysfunction and impaired glucose tolerance in the skeletal muscles, adipose tissue, and liver (Lann, Gallagher & Leroith, 2008). The prevalence of diabetes has risen exponentially. It is estimated that around 25.8 million people in the US have diabetes or about 8.3% of all adults in the country. Globally the prevalence of diabetes is expected to increase to 6.2% by the year 2030 (Wild et.al., 2004). In Thailand, the prevalence of diabetes is 9.6%, including 4.8% previously diagnosed and 4.8% of all cases are undiagnosed (Aekplakorn et.al., 2003). Chronic complications of diabetes continue to create a significant clinical problem. The progression of diabetes can also develop microvascular and macrovascular complications such as neuropathy, nephropathy and retinopathy. Moreover, the incidence of cardiovascular events and stroke increase in people with diabetes (Santaguida et.al., 2005).

Prediabetes is a condition in which individuals have higher blood glucose or A1C levels than normal. People with prediabetes have an increased risk of developing type 2 diabetes. Therefore, an appropriate intervention for preventing or delaying onset of diabetes involves lifestyle modifications like weight reduction, changes in dietary habits, and increased physical activity all of which could reduce the burden stemming from noncommunicable diseases (Tuomilehto et.al., 2001).

Presently, traditional health care systems, including herbal medicine are widespread in developing countries. Herb plants may also have a potential therapeutic role in treatment for diabetes (World Health Organization, 2002). Diabetic patients have been interested in complementary and alternative medicines. Many investigations show that herbal food supplements may influence glucose metabolism and the overall condition of diabetes not only hypoglycemic effect but also improve lipid metabolism, antioxidant status and decrease risk for cardiovascular disease

(Bailey & Day, 1989). Example of these include bitter melon, Gemnema, Korean ginseng, garlic and cinnamon (Shapiro & Gong, 2002).

As a functional food, *Cinnamomum verum* commonly known as true cinnamon or Ceylon cinnamon is in the family of Lauraceae and has been widely used as a flavouring agent. Likewise perfumery and pharmaceutical industries use cinnamon for many applications. In Asian countries, cinnamon has long been used as one of the traditional folk herbs for diabetes mellitus (Bailey and Day, 1989), such as China, India and Korea (Subash-Babu et al., 2007). In previous studies, researchers showed that fasting plasma glucose concentrations in diabetic patients with poor control had reduced after intake cinnamon extract (Mang et al., 2006; Khan et al., 2003). The effect of soluble cinnamon extracts decreased fasting blood glucose levels in prediabetes and the parameter of metabolic syndrome. Although subjects in this study were not required to follow any specific diet or exercise program, it is possible that cinnamon extract may lead to even health benefit in prediabetes (Ziegenfuss et al., 2006). However, these previous data suggest that further studies are needed. Due to the increased prevalence of diabetes and the continuing need for effective treatments of the disease, therefore the aim of this study is to examine the efficacy of cinnamon supplement in reducing the fasting blood glucose level in prediabetes.

Objective

To study the efficacy of cinnamon supplement on fasting blood glucose level in prediabetes subjects.

Scope of the Study

This study enrolled twenty-four volunteers aged between 25 to 50 years old at Thachana hospital, Suratthani, Thailand. Fasting plasma glucose in participants measured after 12 hours were in between 100-125 mg/dL considerably as Pre-diabetes or Impaired Fasting Glucose. The period of this study is in 30 days. The treatment group had given capsules supplement of cinnamon (400 mg/capsule). And the control group had placebo (Carboxymethyl Cellulose, CMC). The participants health's characteristic and blood glucose level were collected before and after taking

cinnamon supplement. All participants were advised to maintain normal diet and physical activity during the study.

Research Design

This research was randomized, placebo-controlled trial. Participants followed overnight fasting for 12 hours. Blood glucose level was measured by glucometer at day 0 and 30. 24 Prediabetes subjects were randomly allocated into 2 groups. In control group, subjects were given placebo 1 capsule 3 times daily after meal. In treatment group, subjects were given cinnamon supplement (400 mg/capsule) 1 capsule 3 times daily after meal. Compliance was monitored by capsule count and contact with subjects. After complete day 30, participants were appointed for the final blood glucose level test.

Statistical Analysis

The data collected included participants' gender, age, body mass index (BMI), Fasting Blood Sugar level (FBS), and HbA1c level. The general characteristic of subjects is performed by using descriptive analysis. Comparison the average of blood glucose level before and after taking JA performed by Paired t-test meanwhile comparison between treatment group and control group was used Independent-test. Level of significance of all tests was set at 0.05 levels.

Results

The result shown as following:

1. The general characteristic analysis

Table 1 The general characteristic of prediabetes Subjects.

Characteristic	Treatment (n=12)	Control (n=12)
Gender		
Male	4	5
Female	8	7
Age (years)		
30-35	1	1
36-40	3	6
41-45	6	4
46-50	2	1
Mean±S.D. (Min-Max)	41.75±4.18 (35-48)	40.25±4.31 (32-48)
BMI (kg/m ²)		
Normal (≥18.5-24.99)	4	3
Overweight (≥ 25-29.99)	7	9
Obesity (≥ 30)	1	1
Mean±S.D. (Min-Max)	26.19±2.13 (23.24-30.12)	26.84±3.07 (22.10-33.53)
FBS (mg/dl)		
Mean±S.D. (Min-Max)	108.00±5.67 (101-118)	104.91±5.92 (102-119)
Smoking	1	2
Drink alcohol	2	3

Table 4.1 describe the general characteristic of subjects was performed by using descriptive analysis. Treatment group had 4 males and 8 females. Control group had 5 males and 7 females. Considered by ages there was not much difference between two groups with 41.75±4.18 age from 35 to 48 years in treatment group and 40.25±4.31 years, age from 32 to 48 years in control group. Treatment group had BMI index mean standard was 26.19±2.13 kg/m² range from 23.24 to 30.12 kg/m² lower than the control group was

28.19±2.61 kg/m² range from 22.10 to 33.53 kg/m². There was 1 and 2 subjects who smoking in the treatment and the control group respectively. The treatment and the control group had 2 and 3 subjects respectively in their drink alcohol habit.

2. Fasting blood glucose analysis

Table 2 Effect of cinnamon and placebo on fasting blood glucose in prediabetes subjects.

Treatment	Day 0		Day 30		d (S.D.)	t	df	p-value
	\bar{X}	S.D.	\bar{X}	S.D.				
Cinnamon (n=12)	108.00	5.67	99.25	5.82	-8.75(2.60)	11.67	11	0.000*
Placebo (n=12)	111.08	5.33	107.08	6.50	-4.00(3.93)	3.52	11	0.005*
t, df; p-value	-1.372, 22; 0.184		-3.110, 22; 0.005*		-3.492, 22; 0.002*			

Effect of Cinnamon and Placebo on Fasting Blood Glucose in Prediabetes Subjects was given in Table 4.2. The mean fasting blood glucose values on day 0 indicated the start of intake of cinnamon supplement and placebo and were considered as control values of the study.

On the starting day of the experiment (day 0) the average of fasting blood glucose (mean ± S.D.) of the treatment group, assigned for cinnamon 1.2 g/day was 108.00±5.67 mg/dL. When the treatment group used the above dose of cinnamon for 30 days, their average mean fasting blood glucose was reduced to 99.25±5.82 mg/dL at p<0.05. In the control group, fasting blood glucose measurement before taking placebo the average was 111.08±5.33 mg/dL. After 30 days the average mean fasting blood glucose was 107.08±6.50 mg/dL at p<0.05.

Therefore there was significant difference in comparison the average of fasting blood glucose between day 0 and day 30 in the treatment group at p<0.05 were observed in both group.

The average of fasting blood glucose between the treatment group and the control group showed no significant changes at Day 0, p-value was equal to 0.184. But at Day 30, the intergroup differences of the average of fasting blood glucose was observed at $p < 0.05$. In addition the mean difference changes showed that there was significance difference between 2 group at $p < 0.05$. No adverse effects of the cinnamon supplement were reported by the participants.

Conclusion and discussion

The fasting blood glucose level was significantly decreased in prediabetes subjects after taking cinnamon supplement and placebo. But the average of fasting blood glucose between the treatment group and the control group showed that there was significantly decreased on fasting blood glucose level at day 30. Moreover the result found that after taking cinnamon supplement for 30 day, the mean difference changes was significance difference between 2 group at $p < 0.05$. On the basis of the result, the fasting blood glucose level after taking cinnamon supplement 1.2 grams/day was decreased with statistically significant within 30 days. Complied with Khan & co researcher in 2003 that daily intake cinnamon capsule 1 gram/day was significantly reduced mean fasting blood glucose within 40 days. Furthermore in 2010, Khan & co researcher found that the mean fasting serum glucose concentration after intake cinnamon capsule 1.5 grams/day for 30 days was significant decrease, nevertheless, the reduction was not showed in placebo group. The previous study showed the extracts of cinnamon activated insulin receptor kinase and inhibited dephosphorylation of the insulin receptor. (Jarvill-Taylor et al., 2001). Dephosphorylation of the receptor β -subunit was associated with the deactivation of its kinase activity lead to insulin signal downregulation (Eldar-Finkelman & Krebs, 1997). This mechanism of cinnamon may affect the blood glucose level.

Therefore the oral administration of cinnamon supplement reduce blood glucose in prediabetes. In addition, cinnamon may have benefit for the remainder of population to control blood glucose level.

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