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## **Preliminary Assessment of Diabetic Youth's Acceptance of Cinnamon in Treating Diabetes: A Telephone Interview**

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*Medications in treatment and control of diabetes can be costly for pediatric patients and families. Therefore, individuals may seek complementary and alternative therapies, such as cinnamon, in addition to traditional treatments. The objective of this study was to determine acceptability of using cinnamon in treatment of diabetes in a pediatric population with diabetes. Seventy-six pediatric diabetes patients at a diabetes clinic participated in a one-time telephone interview using an 18-item, validated questionnaire. Descriptive statistics were utilized to determine cinnamon acceptability and preferences. The majority of the subjects were between 16-18 years (43%, n = 33), Caucasian (62%, n = 47), and female (67%, n = 51). More than three-fourths were overweight or at risk of being overweight (80%, n = 60). Seventy-six percent stated that they would be willing to try cinnamon for treatment of their diabetes, whereas 14.5% were undecided and 9.2% unwilling. Most (n = 56, 52.5%) were willing to take the cinnamon supplement 1-2 times per day. The greatest concerns expressed by subjects were side effects, interaction with current medications, and physician's willingness to approve and prescribe. This research suggests that in consultation with health professionals, diabetic youth are willing to try cinnamon supplementation in the treatment of diabetes.*

*Keywords:* Diabetes, pediatrics, cinnamon, interview

### **Introduction**

According to a 2010 report from the Centers for Disease Control and Prevention (CDC, 2011), in the United States, about 215,000 people under age 20 have diabetes; this is 0.26% of individuals in this age group. Each year from 2002-2005, 15,600 youth were newly diagnosed with type 1 diabetes, and 3,600 were newly diagnosed with type 2 diabetes. Diabetes is associated with higher risks of morbidity and mortality and is the 5th leading cause of death in America

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(American Association of Diabetes Educators, 2012). Individuals with diabetes have two times the risk of death compared to individuals without diabetes (CDC, 2011). Diabetes is associated with a number of complications that intensify with duration of the condition and is the leading cause of kidney failure, nontraumatic lower-limb amputations, and new cases of blindness among adults (CDC, 2011). Cardiovascular disease accounts for approximately 25% of deaths among patients with onset of diabetes before 20 years of age (American Association of Diabetes Educators, 2012). Heart disease and stroke account for about 65% of deaths among all people with diabetes (American Association of Diabetes Educators, 2012).

Individuals with diabetes aim to maintain proper control of their blood glucose and lipid levels to prevent related complications. Methods to control these levels can include a controlled diet, exercise regimen, weight loss, oral medications, and/or insulin (CDC, 2011).

Medications in treatment and control of diabetes can be costly, and their long-term safety is questionable (Eisenberg et al., 1993). Therefore, individuals may seek complementary and alternative therapies such as use of spices and herbs (e.g., cinnamon, ginseng, davana, supari, and aloe vera) in addition to traditional treatments. Several studies have examined the use of complementary and alternative medicine (CAM) in treatment of diabetes in adults (Broadhurst, Polansky, & Anderson, 2000; Egede, Ye, Zheng, & Silverstein, 2002; Garrow & Egede, 2006; Jarvill-Taylor, Anderson, & Graves, 2001; Khan, Bryden, Polansky & Anderson, 1990; Khan & Safdar, 2003; Ryan, Pick, & Marceau, 2001; Schoenberg, Stoller, Kart, Perzynski, & Chapleski, 2004; Shapiro & Gong, 2002; Yeh, Eisenberg, Davis, & Phillips, 2002; Yeh, Eisenberg, Kaptchuk, & Phillips, 2003).

Recently, more studies have focused on cinnamon supplementation, specifically in adult diabetics (for example Crawford, 2009; Klein et al., 2005; Magistrelli & Chezem, 2012; Vafa et al., 2012), with varying results. While an analysis of ten prospective, parallel-group design, randomized controlled trials on cinnamon and diabetes by Leach and Kumar (2012) found there was not sufficient evidence to support the use of cinnamon for type 1 or 2 diabetes, studies by Hlebowicz, Darwiche, Björgell, and Almér (2007) and Magistrelli and Chezem (2012) suggest cinnamon may be effective in moderating postprandial glucose response in normal weight and obese adults. Altschuler, Casella, MacKenzie, and Curtis (2007) found the use of cinnamon does not produce significant improvements in Hemoglobin A1c (HbA1c) for type 1 diabetes, as the disease has different pathophysiology than type 2 diabetes. Still, the number of type 2 diabetes diagnoses in populations under the age of 20 has climbed. To date, little research has examined the efficacy of using cinnamon with the pediatric population or the willingness of diabetic youth to use cinnamon for treatment of diabetes. Therefore, the purpose of this descriptive pilot study was to determine youth's preference and acceptability of cinnamon as a complementary therapy in treatment of diabetes.

## Materials and Methods

One-hundred and seventy-seven pediatric patients who attend or have previously attended a diabetes clinic at a large Midwestern children's hospital were invited to participate in the study. Names and contact information of the participants were obtained from the clinic's pediatric endocrinologist. Subjects' inclusion criteria for the study included the following: 1) age 10-18 and 2) diagnosed with either type 1 or type 2 diabetes for over 1 year. Patients who were pregnant were excluded from this study. Prior to data collection, parental-patient consent was obtained for release of all pertinent medical information.

An 18-item telephone interview questionnaire (12 questions related to cinnamon use and diabetes; 6 demographic questions) was used as a script. The interview questions were reviewed by one endocrinologist, two pediatric dietitians, and two parents for face validity to ensure appropriateness for the pediatric population. Reliability was not assessed because the interview questionnaire was simply measuring conditions and opinions of youth diabetic patients via telephone; actual use of cinnamon was not assessed. Upon approval of the study protocol from the Institutional Review Board, a one-time telephone interview was conducted using the questionnaire. A single researcher conducted all interviews to ensure uniformity in questions. Heights and weights were retrieved from subject's most recent medical records. Descriptive statistics were computed using SPSS software. Further statistical analysis was not utilized due to the preliminary nature of the study and relatively small sample size. Also, researchers were not looking at effectiveness of cinnamon, rather acceptance with the population described.

## Results

From a pool of 177 pediatric diabetic patients, 76 successfully completed the research. Of the remaining 101 potential subjects, 97 could not be contacted due to disconnection of telephone services, incorrect numbers, and/or lack of telephone accessibility. Two patients were over 18 years of age, and two denied having diabetes.

As shown in Table 1, 67% (n = 51) were female, and 33% (n = 25) were male. A majority of subjects were age 16-18 years (43%, n = 33) and Caucasian (62%, n = 47). Other ethnicities represented were African American (n = 25), Asian (n = 2), Latino (n = 1), or mixed (n = 1). Calculation of Body Mass Index for Age indicated 20% of children (n = 15) were at a healthy weight, 25.3% (n = 19) were at risk for overweight, and 54.7% (n = 41) were overweight.

Table 2 presents descriptive statistics related to the current health regimen of participants, including type of diabetes, special diets used, and types and frequency of medications used to control diabetes. The most commonly used types of insulin were Novolog (n = 24, 31.6%) and Lantus (n = 16, 21.1%). Metformin was the most used oral medication (n = 51, 67.1%).

**Table 1. Demographic Information of Subjects (N = 76)**

	<i>n</i> (%)
<b>Gender</b>	
Female	51 (67.1)
Male	25 (32.9)
<b>Age</b>	
10-12	16 (21.1)
13-15	27 (35.5)
16-18	33 (43.4)
<b>Ethnicity</b>	
African American	25 (32.9)
Asian	2 (2.6)
Latino	1 (1.3)
Mixed	1 (1.3)
Caucasian	47 (61.8)

**Table 2. Current Health Regimen of Participants (N = 76)**

	<i>n</i> (%)
<b>Type of Diabetes</b>	
Type 1	24 (31.6)
Type 2	52 (68.4)
<b>Type of Diet Used</b>	
1500-1800 ADA	2 (2.6)
Carbohydrate Counting	23 (30.3)
Eat Less Food	6 (7.9)
Eat Less Sweets	3 (3.9)
Limit Carbohydrates	2 (2.6)
Low Carb/Low Fat	1 (1.3)
No Regular Soda	1 (1.3)
Type Not Provided	2 (2.6)
No Special Diet Used	36 (47.3)
<b>Type of Medication</b>	
Actose	5 (6.6)
Amaryl	2 (2.6)
Byetta	1 (1.3)
Humalog/Humulin	16 (21.1)
Lantus	16 (21.1)
Lente	2 (2.6)
Levamis	1 (1.3)
Metformin	51 (67.1)
Novolog	24 (31.6)
NPH	5 (6.6)

Note: Some participants were taking more than one medication.

Over three-fourths of youth (76.3%,  $n = 58$ ) stated that they would be willing to try cinnamon for treatment of their diabetes, whereas 14.5% ( $n = 11$ ) were undecided, and 9.2% ( $n = 7$ ) were unwilling to try (see Table 3). When questioned on their preference for the type of supplement (e.g., pill, liquid, either) and frequency of use, the majority of those who were willing to try cinnamon or were undecided stated they would prefer a pill. Interestingly, more than 30% (34.2%,  $n = 26$ ) were willing to try either the pill or liquid form of the supplement. More than 50% (60.5%,  $n = 46$ ) were willing to take the cinnamon supplement 1-2 times per day. A small proportion (2.6%,  $n = 2$ ) expressed a desire to take it an unlimited number of times daily. When asked if cinnamon could help control blood glucose levels, the majority of youth were undecided, while a little over one-third stated yes.

**Table 3. Participants' Supplement Preferences ( $N = 76$ )**

	<i>n</i> (%)
<b>Willing to Try Cinnamon</b>	
Yes	58 (76.3)
No	7 (9.2)
Undecided	11 (14.5)
<b>Supplement Form</b>	
Pill	30 (39.5)
Liquid	13 (17.1)
Either	26 (34.2)
Neither	7 (9.2)
<b>Times per Day</b>	
0	7 (9.2)
1	18 (23.7)
2	28 (36.8)
3	14 (18.4)
4	5 (6.6)
5	1 (1.3)
6	1 (1.3)
Unlimited	2 (2.6)

In response to diabetic adolescents, concerns regarding the use of cinnamon, the greatest concerns were side effects (72.4%,  $n = 55$ ) and interaction with current medications (64.5%,  $n = 49$ ). The least concern was number of times the cinnamon supplement would have to be taken each day. Other concerns reported by participants that may influence consideration of cinnamon supplement included: 1) the effect on physiological bodily functions (e.g., eyesight, organs, weight, and nerve impairment) and medical conditions (e.g., asthma, allergies, and dermatological issues); 2) palatability (e.g., taste alteration); 3) effectiveness of supplement; and 4) physicians' willingness to approve and prescribe (see Table 4).

**Table 4. Potential Concerns Expressed by Participants Regarding Cinnamon Supplement Use (N = 76)**

	<i>n</i> (%)
<b>Side Effects</b>	
Yes	55 (72.4)
No	21 (27.6)
<b>Cost</b>	
Yes	45 (59.2)
No	31 (40.8)
<b>Insurance Coverage</b>	
Yes	39 (51.3)
No	37 (48.7)
<b>Number of Times Taken Per Day</b>	
Yes	29 (38.2)
No	47 (61.8)
<b>Interaction with Current Medications</b>	
Yes	49 (64.5)
No	27 (35.5)
<b>Other</b>	
Yes	8 (10.5)
No	68 (89.5)

## Discussion

Limited investigations have been conducted regarding diabetic youth's acceptability of cinnamon as treatment for diabetes. However, several studies have looked at complementary and alternative (CAM) medicine use and the effectiveness of cinnamon. Research by Low, Murray, O'Mahony, and O'B Hourihane (2008) looked at the prevalence of CAM use among the pediatric population in Ireland. Questionnaires were distributed over 4 months to 13 pediatric settings. Researchers found 57% of parents reported using CAM for their child, with the highest usage reported in 2-4 year olds. A similar study conducted in 2010 by Birdee, Phillips, Davis, and Gardiner examined factors associated with pediatric use of CAM in the United States. They found pediatric CAM users ( $n = 9,417$ ) were more likely to be adolescents (AOR 1.36 [1.02-1.80]), to have a parent who used some form of CAM (AOR 3.83 [3.04-4.84]), and more likely to take prescription medications (AOR 1.51 [1.19-1.92]). A Finnish study by Hämeen-Anttila, Niskala, Siponen, and Ahonen (2011) examined the use of CAM among the parents of children under the age of 12 to determine parents' influence on the children's future use. The study examined 4,032 surveys. Thirty-one percent of subjects reported using some type of CAM in the preceding two days. Researchers concluded that women over 30 years of age, with higher education and higher incomes, were more likely to use CAM.

Research most similar to the present study was conducted in 2005 by Klein et al. (2005) and explored adolescents' knowledge of and beliefs about dietary supplements, herbs, and over-the-counter medications. Subjects included 81 adolescents from various groups: suburban adolescents, urban minority adolescents, adolescents with chronic illness (including diabetes), and patients of complementary and alternative medicine practitioners. Focus group results indicated that most adolescents understood the terms "herbal medicine," "herbal remedies," or "nutritional supplements," but many were unfamiliar with the term "alternative medicine." In addition, most adolescents were familiar with CAM therapies used by people from their own culture, and most linked use of CAM for treatment of illness rather than preventative care.

The effectiveness of cinnamon as an alternative or adjunctive therapy for blood glucose control in the adult population has been studied in recent years, with varying results. Crawford (2009) utilized a randomized controlled trial to determine the effectiveness of cinnamon in lowering Hemoglobin A1c (HbA1c) levels in 109 patients with type 2 diabetes. The control group received usual medical care, while the experimental group received medical care in addition to cinnamon capsules. Results indicated HbA1c levels in the experimental group were lowered by 0.83% (95% CI, 0.46-1.2) compared to usual care lowering of HbA1c by 0.37% (95% CI, 0.15-0.59). Vafa et al. (2012) examined the effects of cinnamon consumption on glycemic status of 44 patients with type 2 diabetes in a double-blind placebo-controlled study. They found no significant differences in glycemic indicators between the placebo and treatment groups. Research conducted by Hlebowicz et al. (2007) investigated the effect of cinnamon on postprandial glucose in 14 healthy subjects using a crossover trial. Results indicated the addition of 6 grams of cinnamon to a meal lowered the postprandial glucose response ( $p < 0.05$ ). The recent study from Magistrelli and Chezem (2012) found the addition of 6 grams of cinnamon to the cereal significantly reduced 120-minute glucose AUC ( $p=0.008$ ) and blood glucose at 15 ( $p = 0.001$ ), 30 ( $p < 0.001$ ), 45 ( $p < 0.001$ ), and 60 ( $p = 0.001$ ) minutes. At 120 minutes, blood glucose was significantly higher with cinnamon consumption ( $p < 0.001$ ) compared to a control group.

The present study was unique for several reasons: 1) diabetic youths' perceptions on cinnamon use was gathered using telephone interviews; 2) it is one of the few to examine the pediatric diabetic population's acceptance of cinnamon in regulation of blood glucose levels; and 3) in addition to information on current usage, this research obtained detailed information on mode of administration (including form and frequency) and potential concerns reported by diabetic youth with the use of cinnamon as CAM. There were limitations to this pilot study, including the sample selection which was confined to diabetic children and adolescents at one hospital with telephone accessibility. The use of a closed-ended questionnaire could lead to bias, and parents may have influenced the participants and possibly their answers to interview questions. Future research could focus on a qualitative inquiry to further explore the results of the present study, with additional statistical analysis.

The rise in diabetes in the pediatric population has encouraged health professionals to examine alternative forms of treatment. When compared to conventional therapies, it is possible that utilization of cinnamon may be beneficial in diabetes control resulting in greater patient compliance with decreased side effects. While it is premature to recommend cinnamon as a treatment for pediatric diabetes based on lack of research with this population, this preliminary study suggests that in consultation with health professionals, diabetic youth are willing to try cinnamon in the form of a pill as an alternative (or in conjunction with traditional medical care) in the treatment of diabetes.

Diabetes management is a collaborative effort and alternative treatments add another avenue to address the growing issue of pediatric diabetes. Barriers may be addressed by working with community organizations, hospitals and schools to disperse information on new treatments as they become available. Should research continue to support improved outcomes with the use of cinnamon for blood glucose control in type 2 diabetes, it is important to know if prospective patients would be open to utilizing new methods of treatment. The findings of the present study reveal that the majority would be open to trying cinnamon if it is proven a reliable treatment. Therefore, randomized clinical trials with this population would be recommended to determine the efficacy of using cinnamon as a complementary treatment for diabetes.

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