Cinnamon and its prospects in folk medicine.

Hikmatova Madina Furkatovna.
Bukhara State Medical Institute
Doctoral student BGMI ORCID ID0000-0001-8072-3687
doctor hikmatova @ gmail.com , 90.5121524

Cinnamon (Cinnamomum verum and Cinnamomum cassia) is widely used as a spice, but its medicinal properties also find application in clinical practice, especially in the therapy of internal medicine. Cinnamon has antioxidant, anti-inflammatory and hypoglycemic properties. The active components of cinnamon, such as cinnamaldehyde, stimulate glucose metabolism and have a positive effect on blood sugar levels, which is especially useful in type 2 diabetes. Cinnamon also reduces cholesterol and triglyceride levels, improving the lipid profile of patients. The anti-inflammatory properties of cinnamon help reduce inflammation in chronic diseases such as rheumatoid arthritis and cardiovascular diseases. However, in high doses, cinnamon bark can cause toxic effects due to the coumarin content, which requires caution and monitoring in clinical settings.

Key words: cinnamon, antioxidant, anti-inflammatory, hypoglycemic, anti-inflammatory, coumarin.

Annotation

Cinnamon (Cinnamomum verum and Cinnamomum cassia) is a promising treatment for the management of type 2 diabetes in clinical practice. It contains active substances such as cinnamaldehyde, which have a positive effect on carbohydrate metabolism and blood sugar levels. Studies show that cinnamon can improve tissue sensitivity to insulin and help reduce fasting glucose levels, as well as reduce glycated hemoglobin (HbA1c). [12; 34-36-s, 14; 51-56-s, 17; 51-56-s, 34; 91-100-s]

Additional positive effects of cinnamon include antioxidant and anti-inflammatory effects, which may be useful in preventing diabetes complications such as cardiovascular disease. Cinnamon also has a positive effect on the lipid profile, reducing total cholesterol and triglyceride levels, which reduces the risk of atherosclerosis in patients with diabetes. However, the use of cinnamon in therapeutic doses requires caution and supervision by specialists, as long-term use in high doses can lead to side effects associated with the coumarin content. Cinnamon (Cinnamomum verum and Cinnamomum cassia) is rich in biologically active compounds that determine its healing properties. The main components of cinnamon include: Essential oils - make up about 1-5% of cinnamon, of which the main component is cinnamaldehyde, which gives the spice its characteristic aroma and taste. It also has antioxidant, anti-inflammatory and hypoglycemic properties. [39; 28-31-c, 46; 186-194-c, 35; 121-145-c.].

Phenolic Compounds – Cinnamon contains flavonoids such as quercetin and proanthocyanidins, which have strong antioxidant properties, protecting cells from oxidative stress. Coumarin – Found in cassia and to a lesser extent in Cinnamomum verum. Coumarin has an anticoagulant effect, but in high doses it can be toxic to the liver and kidneys. Polysaccharides – For example, mucilagens, which have an anti-inflammatory effect, beneficial for mucous membranes. Vitamins and Minerals – Cinnamon is rich in potassium, calcium, magnesium, and also contains vitamin C, vitamin K and B vitamins, which are beneficial for the overall metabolism of the body. Tannins – have astringent properties and help with inflammation and diarrhea. Due to its unique composition, cinnamon is used both in cooking and in medicine for

the treatment and prevention of various diseases, including diabetes, infections, inflammatory and cardiovascular diseases. [17; 72-78-s, 20; 10-15-s, 27; 168-170-s].

Materials and methods. The dynamics of the study was carried out in the vivarium of the Bukhara State Medical Institute in 2024. For the experimental study, 60 white male rats weighing 130-150 g were selected. All laboratory animals were obtained from the same vivarium and were of the same age. The vivarium buildings were cleaned every morning, the work on cleaning the cages and vivarium buildings was carried out in clean special clothing. Until the end of the experiment, the corpses of dead animals were buried in the ground, disinfected with a 20% chlorine solution according to the ICT for the disposal of dead laboratory animals. All groups are formed simultaneously. Care for laboratory animals participating in the experiment corresponded to age, sex, weight, storage and feeding conditions.

The first group (intact) control group of 20 rats was fed a standard diet with normal amounts of sugar so that the scientists could compare the results with the other groups.

The second group of 20 rats received an average of 12-14 ml of sugar water per day in their diet. This corresponds to 100 g of body weight. This solution is given for 1 month.

Groups (k-control, e-experiment)	Contents of the experience	Young animals 3 months	Total number of animals (*dead rats number)
I to	Group 1 - rats in standard vivarium conditions on an intact diet.	20	5
II e	Group 2 – on independent nutrition in a standard diet. On average 12-14 ml of sugar water per day for 1 month. Accepted rats	20	6
III e	Group 3 – on independent nutrition in a standard diet. On average 12-14 ml of sugar water per day for 1 month. And cinnamon , 5 ml once a day in the morning during meals. Accepted rats	20	
General		60	11

Consuming too much sugar can have harmful effects on various body systems, especially over the long term. Sugar is high in calories and easily digested, which can lead to weight gain. Excess sugar, especially in drinks and foods with added sugar, can contribute to the accumulation of fat deposits, especially in the abdominal area.

A third group of 20 rats also consumed the same dose of sugar, but in this case they received 5 ml of carnitine in their diet once a day during the morning meal for 1 month.

Results . Below is a table that describes the glucose control in rats with diabetes mellitus under standard conditions and when using cinnamon . The table includes the main parameters that affect blood sugar levels and their changes when using cinnamon .

Healthy rats have stable blood sugar levels within 4-6 mmol/l, which is normal for rodents. Diabetic rats exhibit significant increases in glucose levels (up to 15-20 mmol/L) depending on the severity of the disease. Rats treated with cinnamon show a 20-30% reduction in glucose levels, which helps control diabetes, but a full return to normal requires complex treatment and long-term use of the mixture. The mixture helps improve glucose metabolism and promotes more stable blood sugar levels, although it is not a complete replacement for insulin therapy or other medications.

Stages	Description	Effect on the body
1. Increased blood sugar levels (development of diabetes)	Blood glucose levels increase due to impaired cell sensitivity to insulin, which leads to insufficient utilization of sugar and the development of hyperglycemia.	Constantly high blood sugar levels cause damage to blood vessels and organs such as the kidneys, heart and eyes. Symptoms such as thirst, frequent urination, fatigue and blurred vision appear.
2. Using Cinnamon to Control Diabetes	Cinnamon is added to the diet as an adjunct to the main treatment, for example, in the form of powder or extract. The active substances in cinnamon, such as cinnamaldehyde, affect blood sugar levels.	Cinnamon helps improve tissue sensitivity to insulin, which helps cells absorb glucose more efficiently. It also lowers fasting glucose levels and improves lipid profiles, reducing the risk of diabetes complications.
3. Lowering blood sugar and improving your condition	With regular use of cinnamon as part of a comprehensive diabetes treatment, blood sugar levels can gradually decrease, reaching more stable levels.	Lowering sugar levels helps prevent diabetes complications. General well-being improves, glycated hemoglobin levels normalize, and the risk of damage to blood vessels and internal organs decreases.

Development of Diabetes: In diabetes, blood glucose levels become high because the body's cells lose sensitivity to insulin. As a result, sugar accumulates in the blood, causing hyperglycemia. Constantly high sugar levels harm blood vessels and organs such as the heart, kidneys, and eyes, leading to complications such as blurred vision, thirst, frequent urination, and fatigue. Introducing Cinnamon to Control Diabetes: As an adjunct to the main treatment, cinnamon is added to the diet, usually in the form of powder or extract. Cinnamon contains active substances such as cinnamaldehyde, which help improve tissue sensitivity to insulin. This helps cells better absorb glucose, lowering blood sugar levels. Cinnamon also improves the lipid profile, lowering cholesterol and triglycerides, which reduces the risk of cardiovascular complications.

Discussion. Excessive amounts of glucose in the body, especially in uncontrolled diabetes or other carbohydrate metabolism disorders, can have a negative impact on various

organs and systems. Here are the main organs that suffer from high glucose levels and the possible consequences:

1. Cardiovascular system

Atherosclerosis: High glucose levels can damage the walls of your arteries, causing plaque to form, which narrows the blood vessels. This increases the risk of atherosclerosis, heart attacks, and strokes.

Hypertension: Excess sugar can raise blood pressure, which puts more strain on the heart.

Increased triglyceride levels: High blood sugar levels contribute to increased levels of fat in the blood, which worsens the lipid profile.

2. Kidneys

Diabetic nephropathy: Long-term exposure to high levels of glucose damages the kidneys. This leads to poor blood filtration, protein in the urine (proteinuria), and may eventually lead to kidney failure.

Increased stress on the kidneys: Excess sugar forces the kidneys to work harder to eliminate excess glucose in the urine, which increases the risk of kidney failure.

3. Eyes

Diabetic retinopathy: Chronically high sugar levels damage the small blood vessels in the retina, leading to vision loss or even blindness.

Cataracts: High glucose levels can accelerate the development of cataracts, a clouding of the lens that impairs vision.

Glaucoma: High glucose levels can lead to increased pressure in the eye, increasing the risk of glaucoma, which can also lead to blindness.

4. Nervous system

Diabetic neuropathy: Excess glucose damages nerves, which can cause loss of sensation, tingling, pain, especially in the extremities (arms and legs). In severe cases, this can lead to amputation.

Autonomic neuropathy: The nerves that control internal organs can also be damaged, causing problems with digestion, heart rhythm, urination, and other functions.

5. Skin

Diabetic Ulcers: Poor circulation and nerve damage combined with high sugar levels increase the risk of ulcers on the legs and other parts of the body that heal slowly and can lead to infections.

Frequent Infections: High sugar levels weaken the immune system and make the skin more vulnerable to infections such as fungal infections, bacterial infections and other skin problems.

6. Liver

Fatty Liver Disease: Excess glucose can be converted into fat, which contributes to the accumulation of fat in the liver and the development of non-alcoholic fatty liver disease.

Increased stress on the liver: Constantly high sugar levels can impair liver function and cause inflammation.

7. Brain

Cognitive impairment: Excess sugar impairs cognitive function, which can lead to poor memory, concentration, and learning ability. High sugar levels may be associated with an increased risk of developing neurodegenerative diseases such as Alzheimer's disease.

Mini-strokes: Damage to small blood vessels in the brain can lead to mini-strokes, which gradually impair cognitive abilities.

8. Pancreas

Pancreas overload: Constantly high blood sugar levels cause the pancreas to produce more insulin. Over time, this can lead to beta cell exhaustion and the development of type 2 diabetes.

Insulin resistance: Excess glucose causes cells to become less sensitive to insulin, which worsens metabolic disorders.

9. Joints and bones

Joint damage: High glucose levels can contribute to inflammation in the joints, which increases the risk of arthritis and other musculoskeletal diseases.

Osteoporosis: People with diabetes may have an increased risk of osteoporosis, which makes bones more fragile and prone to fractures.

10. Immune system

Decreased immunity: High glucose levels impair the function of immune cells such as white blood cells, which increases susceptibility to infections.

Delayed wound healing: High blood sugar levels impair tissue healing, which increases the risk of complications from injuries and wounds.

11. Digestive system

Gastroparesis: High glucose levels can disrupt the nervous system that controls the stomach, slowing down the digestion of food and causing symptoms such as nausea, vomiting, and bloating.

Constipation and Diarrhea: Damage to the nerves in the intestines can cause dysfunction, causing chronic constipation or diarrhea.

Conclusion:

Excess glucose in the body has a systemic destructive effect on many organs and systems. That is why it is important to control blood sugar levels, follow recommendations for nutrition, physical activity and medication to prevent complications associated with diabetes and other metabolic disorders.

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