

# Exploring the Health Benefits of Cinnamon and Stevia: A Comprehensive Review

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## ABSTRACT

Cinnamon tree is native to Sri Lanka (formerly known as Ceylon) and parts of Southeast Asia. Cinnamon was initially harvested from wild trees in these regions. Cinnamon was highly prized in ancient times for its aromatic and medicinal properties

Cinnamon is a spice obtained from the inner bark of several species of trees belonging to the genus *Cinnamomum* it is also known as dalcini . cinnamon has been used in traditional medicine for its potential health benefits. It is believed to have antioxidant, anti-inflammatory, antimicrobial, and antidiabetic properties. Some studies suggest that cinnamon may help lower blood sugar levels, improve insulin sensitivity, reduce cholesterol levels, and have other positive effects on health

**KEYWORDS:** Antioxidant, Anti inflammatory, Blood sugar control,Heart health, Antimicrobial properties, Neuroprotective effects, Alzheimer's and Parkinson's disease, Diabetic

## I. INTRODUCTION –

Cinnamon, scientifically known as *Cinnamomum zeylanicum* and Cinnamon cassia, is a tropical tree from the Lauraceae family and is widely recognized as a staple spice around the world. This spice is primarily composed of essential oils and other substances like cinnamaldehyde, cinnamic acid, and cinnamate. Cinnamon possesses properties that make it an antioxidant, anti-inflammatory, antidiabetic, antimicrobial, and anticancer agent. It is also known to help lower lipid levels and reduce cardiovascular risks. Additionally, cinnamon has demonstrated potential benefits in combatting neurological disorders such as Parkinson's and Alzheimer's diseases. Cinnamon, whose name comes from a Latin word meaning "sweet wood," refers to the inner bark of evergreen cinnamon trees, which is considered the most important part of these plants in the Lauraceae family. There are two primary varieties of cinnamon (Gruenwald, Freder, and Armbruester 2010).

Cassia cinnamon is grown in Vietnam and Indonesia, while Ceylon cinnamon is cultivated in India and Sri Lanka. The enjoyable sweet flavor found in the inner brown bark of *Cinnamomum* trees dries into tubular sticks known as "quills." This herb contains a wealth of nutrients, including minerals such as iron, crucial for red blood cell production; potassium, important for body fluids, cell function, and regulating blood pressure and heart health; and magnesium and copper, which facilitate enzyme activity like superoxide dismutase. Cinnamon is also rich in vitamins such as pyridoxine, pantothenic acid, niacin, and vitamin A. Consuming as little as half a teaspoon daily can positively impact digestion, glucose levels, and immune system function. Larger doses may aid in improving heart disease risk, tumors, and type 2 diabetes. Additionally, cinnamon offers benefits for toothaches, oral infections, and gastrointestinal and colon health. These numerous advantages make cinnamon a widely used daily herb around the world.

*Stevia rebaudiana*, a plant native to South America, is increasingly being cultivated globally due to its abundance of sweet compounds. The sweetness of stevia primarily comes from steviol glycosides, which are about 250-300 times sweeter than sugar. Research has indicated the advantages of using Stevia extract over traditional sugar and artificial sweeteners, though it remains an underutilized sugar substitute. This review provides an overview of the current data on the biological effects of Stevia extract and its individual glycosides, including benefits such as anti-hypertensive, anti-obesity, anti-diabetic, antioxidant, anti-cancer, anti-inflammatory, and antimicrobial properties, as well as positive effects on kidney function.

The leaves of *Stevia rebaudiana* contain diterpene glycosides, which provide a sweet taste with zero calories when added to food products. Native Guarani Indians in South America have used stevia for centuries as a natural sweetener to balance the bitterness of various medicines and

beverages. These glycosides are sweeter than sucrose and are now employed as sugar replacements in foods and. They are stable across a range of temperatures and pH levels during food processing and do not have shelf life limitations. Importantly, these glycosides do not cause a glycemic response upon consumption, making them suitable for individuals with diabetes or obesity. India presents significant potential demand for this natural sweetener due to its growing diabetic and obese population. This article aims to outline the plant's profile and basic cultivation, harvesting, drying, and extraction techniques for steviol glycosides. Additionally, it provides a summary of safety concerns and regulatory approvals for the use of steviol glycosides in food products globally.

#### ORIGIN OF CINNAMON AND STEVIA

Cinnamon's use dates back to around 2800 BC when it was originally called "Kwai" in Chinese. It was an ingredient in the anointing oil used by Moses for sanctification, as mentioned in the Bible. The Romans valued cinnamon for its medicinal properties in treating digestive and respiratory issues, and they also used it in funerals to mask the odor of dead bodies. In Egypt, it was used for embalming mummies and for its scent and flavoring qualities.

Due to its high cost and value, the quest for cinnamon spurred world exploration in the 15th century. It was a driving force behind Christopher Columbus's journey, leading to the discovery of the New World, and Vasco da Gama's exploration of South India and Sri Lanka. True cinnamon, also known as Ceylon cinnamon, was found in Sri Lanka (previously Ceylon). Any country that controlled the region would dominate the world trade of cinnamon and benefit greatly. Initially, the Portuguese held control, later overtaken by the Dutch, followed by the British in 1815. Today, cinnamon is grown in Sri Lanka along the coastal belt from Negombo to Matara.

*Stevia rebaudiana* is a small perennial plant reaching heights of 65-80 cm, with sessile,

oppositely arranged leaves. Various species of *Stevia* offer potential sweetening compounds, but *S. rebaudiana* is the sweetest. This semi-humid subtropical plant can be cultivated like any vegetable crop, even in home gardens, as long as the soil has a pH between 6.5 and 7.5 and is well-drained, avoiding saline soils. *Stevia* has been successfully grown in recent years in Indian states such as Rajasthan, Maharashtra, Kerala, and Odisha due to the rising demand for natural sweeteners. Diterpene glycosides, extracted from *Stevia*, are the natural sweetening agents, with wild *Stevia* leaves containing varying levels of dulcoside, rebaudioside C, rebaudioside A, and stevioside.

*Stevia* (Asteraceae) is a woody shrub that can grow up to 80 cm when fully mature and includes at least 110 species, possibly up to 300. Its habitat ranges from the southwestern United States to the Brazilian highlands. While *S. rebaudiana* is the sweetest species, *Stevia* is used as a sweetener in various regions such as Central and South America, where the plant is native, as well as in Japan. Japanese people incorporate *Stevia* into products like seafood, soft drinks, and candies. The plant has also been utilized in Brazil and Paraguay as a natural diabetes treatment.

#### CHEMICAL CONSTITUENTS

Different types of cinnamon primarily consist of various components such as CD, CA, and cinnamate, along with essential oils (Table 1). These oils include leaf oil of Ceylon cinnamon and bark oil, both known for their eugenol content (Gotmare and Tambe, 2019). Cinnamon cassia contains CA oil, which is utilized for its antifungal properties in treating infections, preventing food spoilage, and in cosmetics (Sukatta, Haruthaithanasan, and Chantarapanont, 2008). The leaf oil of longipetiolatum cinnamon is rich in camphor, which is used topically to reduce pain and treat infections (Gruenwald, Freder, and Armbruester, 2010). Table 1 outlines the percentage of chemical compounds in cinnamon oils (Rao and Gan, 2014).

S. No.	Plant	Compound
1.	Leaf of cinnamon	Cinnamaldehyde 1.00% -5.00%
2.	Bark	Cinnamaldehyde 65.00 -81.00
3.	Bark root	Camphor 60.00%
4.	Fruits	Trans cinnamal acetate 42-54%

The complete chemical makeup of Stevia species is not fully known, though several species have been analyzed for their chemical compositions. The leaves of this shrub are the most useful part. Out of 110 species tested for sweetness, only 18 exhibited this characteristic. Eight ent-kaurene glycosides, including dulcoside A, rebaudiosides A to E, steviolbioside, and stevioside, are responsible for the sweet taste (Kinghorn et al. 1984). These glycosides are mainly derived from the diterpene steviol (Shibata et al. 1995).

*S. rebaudiana* Bertoni, the sweetest species, contains all eight ent-kaurene glycosides in its leaves, with stevioside being the dominant compound (3-8% of dried leaf weight) (Melis 1992). Additionally, *S. rebaudiana* Bertoni contains sterols such as stigmasterol,  $\beta$ -sitosterol, and campesterol (D'Agostino et al. 1984). This species also includes steviol, formed through enzymatic hydroxylation within the plant (Kim et al. 1996).

Other non-sweet compounds are also present in Stevia species and may even have a bitter taste. These include stevisalioside A from the roots of *Stevia salicifolia*, longipinane derivatives in the roots of *Stevia connata*, epoxyabdane diterpenes, and a clerodane derivative in the leaves of *Stevia subpubescens*. Additionally, flavonoids and other derivatives can be found in the leaves of several Stevia species, including *Stevia rebaudiana*, *Stevia nepetifolia*, *Stevia microchaeta*, *Stevia monardifolia*, *Stevia organoides*, and *Stevia procumbens*. Sesquiterpene lactones from the aerial parts of *S. procumbens* and the leaves of *S. organoides* also fall into this category.

## BOTANICAL DESCRIPTION

### CINNAMON

**Tree** -The most commonly used species for commercial cinnamon production include *Cinnamomum verum* (Ceylon cinnamon) and *Cinnamomum cassia* (cassia cinnamon).



### **Cinnamomum verum (Ceylon cinnamon)**

The Ceylon cinnamon tree is an evergreen tree that can grow up to 10-15 meters tall. It has smooth, papery bark and oval-shaped leaves that are green on top and silvery underneath. Ceylon cinnamon has a mild, sweet flavor and is considered to be of higher quality compared to cassia cinnamon.

### **Cinnamomum cassia (cassia cinnamon).**

It is a larger tree compared to Ceylon cinnamon, growing up to 20-30 meters tall. The bark of the cassia cinnamon tree is thicker and more coarse than that of Ceylon cinnamon. Cassia cinnamon has a stronger, more pungent flavor and aroma compared to Ceylon cinnamon.

## LEAVES

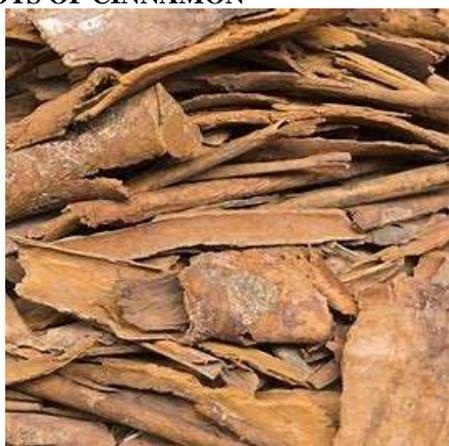


The leaves of the cinnamon tree (*Cinnamomum verum* and *Cinnamomum cassia*) are also utilized, albeit to a lesser extent than the bark, in various culinary and medicinal applications.

Cinnamon leaves are elliptical or lance-shaped, with a glossy green color. They typically measure around 7 to 18 centimeters in length and 2 to 7 centimeters in width. The leaves are arranged alternately on the branches of the tree.

Cinnamon leaves have been used for their potential health benefits. They are believed to possess properties that may help alleviate digestive issues, stimulate circulation, and provide relief from minor ailments. Cinnamon leaf oil, extracted from the leaves, is used in aromatherapy and in various topical applications.

#### ROOTS OF CINNAMON



The roots of cinnamon trees contribute to the overall health and growth of the tree, they are not typically consumed or used for culinary or medicinal purposes. The bark, with its aromatic and

flavourful properties, remains the most sought-after part of the cinnamon tree for human use

#### FRUIT



The fruits of cinnamon trees are small, berry-like drupes that develop after the flowers of the tree are pollinated. These fruits typically contain a single seed within them. The appearance and size of the fruits can vary depending on the species of cinnamon tree.

#### STEVIA LEAVES



Stevia leaves are typically bright green, with a slightly serrated margin and an oval or elliptical shape. They are sessile, meaning they attach directly to the stem without a stalk

The leaves are oppositely arranged along the stem, growing in pairs.

The leaves are usually around 2-3 cm (0.8-1.2 inches) in length and 1-2 cm (0.4-0.8 inches) in width, though their size can vary depending on growing conditions

Stevia leaves have a smooth texture and may sometimes feel slightly sticky due to the presence of resinous compounds.

**PHARMACOGNOSY**

PHARMACOGNOSY	CINAMMON	STEVIA
BINOMIAL NAME	Ceylon cinnamon	Stevia rebaudiana.
SYNONYM	Cassia Ceylon Cinnamon, Cinnamon Stick Cinnamon Powder Cinnamon Bark Cinnamon Flavour Sweet Wood Dalchini	Steviarebaudiana. Sweet leaf Sugar leaf
FAMILY	Lauraceae family	Asteraceae family
SCIENTIFIC CLASSIFICATION		
Kingdom	Plantae	Plantae
Genus	Cinnamomum	Stevia
Species	Cinnamomum verum	Stevia rebaudiana
Active constituent	cinnamaldehyde ,cinnamic acid ,cinnamyl alcohol ,polyphenols ,coumarin	Stevioside Rebaudiosides Dulcoside A Steviolbioside

**Scope of nutraceutical and targeted audience**

Cinnamon and Stevia offers a wide range of potential health benefits and therapeutic applications, making it a valuable ingredient in herbal nutraceuticals. Its antioxidant, anti-inflammatory, blood sugar-regulating, antimicrobial, and digestive properties contribute to its diverse scope in promoting overall health and well-being. However, while cinnamon shows promise as a nutraceutical ingredient, further research is needed to fully understand its mechanisms of action and optimal therapeutic doses for various health conditions.

The targeted audience for herbal nutraceutical tablets includes individuals seeking natural and holistic approaches to health and wellness, as well as healthcare professionals, researchers, and industry experts involved in integrative medicine, dietary supplementation, and pharmaceutical development. This audience is interested in evidence-based herbal formulations

that offer therapeutic benefits, preventive health support, and minimal side effects. Consumers may be drawn to herbal tablets for various health concerns, including immune support, stress management, cognitive enhancement, and chronic disease prevention. Healthcare professionals seek reliable information on herbal products for patient recommendations and adjunctive therapy. Researchers and industry experts aim to advance knowledge and innovation in herbal formulation science.

The targeted audience for cinnamon herbal nutraceutical tablets may include individuals who are interested in natural remedies and alternative health approaches, as well as those seeking specific health benefits associated with cinnamon. Here are some potential target audiences for cinnamon herbal nutraceutical tablets

**People with diabetes or prediabetics** - Cinnamon and Stevia has been studied for its potential to help regulate blood sugar levels and improve insulin

sensitivity. Therefore, individuals with diabetes or prediabetes who are looking for natural ways to manage their condition may be interested in cinnamon tablets.

**Individuals interested in weight management** - Some research suggests that cinnamon and Stevia may support weight loss efforts by helping to regulate blood sugar levels, curb cravings, and promote satiety. People seeking natural supplements to support their weight management goals may be drawn to cinnamon tablets.

**Individual with cardiovascular disorders**- Cinnamon and Stevia has been studied for its potential cardiovascular benefits, including its ability to help lower cholesterol levels and improve lipid profiles. Individuals interested in maintaining heart health and reducing their risk of cardiovascular disease may consider taking cinnamon tablets as part of their regimen with sweetening agents like stevia

**People seeking antioxidant support** - Cinnamon and stevia contains potent antioxidants that help neutralize free radicals and reduce oxidative stress in the body. Individuals looking to support their immune system, protect against cellular damage, and promote overall health and longevity may be interested in cinnamon tablets.

**Athletes and fitness enthusiasts** - Cinnamon's potential to enhance exercise performance, improve recovery, and support muscle health may appeal to athletes and fitness enthusiasts looking for natural supplements to optimize their training and recovery.

**People with digestive issues**- Cinnamon has been traditionally used to aid digestion and alleviate gastrointestinal discomfort. Individuals experiencing digestive issues such as bloating, gas, or indigestion may find relief from cinnamon tablets.

**Health conscious individuals** -Generally, individuals who prioritize their health and wellness and seek natural alternatives to conventional medications may be interested in incorporating cinnamon tablets into their daily routine as a preventive measure or to address specific health concerns.

**Those interested in natural anti-inflammatory remedies:** Cinnamon and Stevia exhibits anti-inflammatory properties that may help reduce inflammation in the body. People with inflammatory conditions such as arthritis, inflammatory bowel disease (IBD), or chronic pain may consider cinnamon tablets as part of their holistic treatment approach.

## Applications of Cinnamon and Stevia

### Culinary Uses:

**Flavouring**- Cinnamon is a versatile spice used in sweet and Savory dishes worldwide, from baked goods and desserts to curries, soups, and marinades.

**Beverages** - Cinnamon is added to hot drinks such as tea, coffee, hot chocolate, and mulled wine for a warming and aromatic flavour.

**Seasoning** -Cinnamon is often used as a seasoning in spice blends, such as garam masala, Chinese five-spice powder, and pumpkin spice

### Medicinal Uses:

**Anti inflammatory** Cinnamon has potential anti-inflammatory properties and may help alleviate symptoms of inflammatory conditions.

**Anti oxidant** Cinnamon is rich in antioxidants, which can help protect the body from oxidative stress.

**Blood sugar regulation** : Some research suggests that cinnamon may help regulate blood glucose levels, making it potentially beneficial for individuals with diabetes.

**Antimicrobial** - Cinnamon has natural antimicrobial properties and may be effective against certain bacteria and fungi.

**Heart health** -Cinnamon may have potential benefits for heart health, including reducing blood pressure and cholesterol levels

### Cosmetic and Household Uses:

**Aromatherapy**- Cinnamon's warm and spicy aroma makes it a popular choice in essential oils and aromatherapy blends.

**Skincare** - Cinnamon may be found in skincare products for its potential antibacterial and anti-inflammatory effects.

**Natural preservative** : Cinnamon's antimicrobial properties make it a potential natural preservative for certain foods and cosmetic products.

**Home freshener:** Cinnamon can be used to freshen the air and add a pleasant scent to the home

### Culinary Applications:

**Natural sweetener** -Stevia is used as a natural sweetener in a variety of foods and beverages, including baked goods, desserts, soft drinks, and teas. It provides sweetness without calories and does not affect blood sugar levels

**Sugar substitute** -Stevia can be used as a sugar substitute in cooking and baking, although adjustments to recipes may be needed due to its intense sweetness.

**Flavoured syrup and extracts** -Stevia can be used to create flavored syrups and extracts for culinary use.

**Low calorie and diet products** Stevia is commonly found in products marketed for low-calorie and diet options, such as diet sodas and sugar-free snacks

#### **Medicinal Applications:**

**Blood sugar management** - Stevia is considered a suitable sweetener for individuals with diabetes because it does not cause spikes in blood glucose levels.

**Weight management** -As a low-calorie sweetener, Stevia can be used in weight management and diet plans to reduce calorie intake.

**Potential health benefits** -Some studies suggest that Stevia may have antioxidant, anti-inflammatory, and anti-hypertensive properties, which may offer potential health benefits.

#### **Cosmetic and Personal Care Applications:**

**Skincare products** - Stevia extracts may be used in skincare products for their potential antioxidant and anti-inflammatory effects.

**Oral care** -Stevia can be found in oral care products such as toothpaste and mouthwash due to its sweetness and potential antimicrobial properties

#### **Industrial and Other Application:**

**Food manufacturing** - Stevia is widely used in the food industry as a natural sweetener in products such as yogurt, sauces, and processed foods.

**Beverage products** - Stevia is commonly used in the production of sugar-free and low-calorie beverages.

**Dietary supplements** - Stevia may be included in dietary supplements as a natural sweetener.

## **II. CONCLUSION**

Our study highlights the promising potential of cinnamon herbal nutraceutical tablets as a natural supplement for promoting health and well-being. Through its rich content of bioactive compounds, cinnamon demonstrates various therapeutic properties, including blood sugar regulation, cardiovascular support, antioxidant activity, and anti-inflammatory effects. These findings suggest that cinnamon tablets may offer valuable benefits for individuals seeking natural approaches to manage diabetes, support heart health, combat oxidative stress, and alleviate inflammation.

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