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A MULTIUSEFULL PLANT OF CINNAMON: A PHARMACOLOGICAL REVIEW

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ABSTRACT

The eternal tree of tropical medicine, belongs to the Lauraceae family known as Cinnamon (*Cinnamomum zeylanicum*, and *Cinnamomum cassia*), it is a multifacilitated medicinal plant having the medicinal value of each part of tree. Cinnamon primarily contains vital oils, cinnamaldehyde, cinnamic acid, and cinnamate etc. In addition to being an antioxidant, anti-inflammatory, antidiabetic, antimicrobial, anticancer, lipid-lowering, and cardiovascular-disease-lowering compound, in this article we are focus on the origin, cultivation collection of Cinnamon tree.

Keywords: Cinnamon oil, Cinnamon tea, Anti-ulcer, Hepatoprotective, Massage therapy, Cold, Sore throat and Cough.

INTRODUCTION

Cinnamon (*Cinnamomum verum*, synonym *C. zeylanicum*) is an evergreen tree, having the height 32.8-49.2 feet (10-15 meters) tall, belonging to family Lauraceae, native to South India and Sri Lanka. Flavor of cinnamon is due to its aromatic essential oil which makes up 0.5 to 1% of its composition. Cinnamon flowers, is arrange panicles, having a greenish colour and have a distinct odour. Cinnamon is high in antioxidant activity and its oil poses antimicrobial properties, which aid in the preservation of certain foods. "Cinnamon" has been reported to have remarkable pharmacological effects in the treatment of type II diabetes. Cinnamon (*Cinnamomum cassia* L.) is generally used as spices and recognized as folk herbal medication, immunomodulatory antimicrobial, antitumor, cholesterol lowering and antiinflammatory, etc.

CHEMISTRY OF CINNAMON

The *Cinnamon* is having resinous compounds, essential oils, like Cinnamic acid, Cinnamaldehyde and Cinnamate. Essential oil such as caryophyllene oxide, trans-cinnamaldehyde, eugenol, b-caryophyllene, L-borneol, L-bornyl acetate, E-nerolidol, and cinnamyl acetate, α -Cubebene, Terpinolene, α -Terpineol and α -Thujene.

Chemical structure of constituent follow in the cinnamon are as follow.

BENEFITS OF CINNAMON OIL ON HEALTH

Cinnamon essential oil reduce the inflammation, antimicrobial and to stimulate circulation, reduce stress,

improve digestion, protect against insect bites, and relieve pain,

Uses for Cinnamon Essential Oil

- ✓ colds ,cough, constipation
- ✓ fungal infections, bacterial infections
- ✓ fatigue, indigestion

BENEFITS OF CINNAMON FOR DIABETES

Daily drinking a cinnamon tea on a regular basis the effect of cinnamon on blood sugar level is decreases in humans, After 40 days, all three amounts of cinnamon reduced fasting blood glucose by 18 to 29%, triglycerides by 23 to 30%, LDL cholesterol (bad cholesterol) by 7 to 27%, and total cholesterol by 12 to 26%.

Precaution- Pregnant women should avoid excessive amounts of cinnamon and should not take it as a supplement because some time it can causes serious complications (such as stroke, kidney disease, and heart disease).

CINNAMON TEA

Cinnamon has a naturally sweet flavor and delicious. It has been used in traditional Chinese medicine and Ayurveda for a variety of health conditions from indigestion to colds.

Ingredients

- 1 cinnamon stick
- 1 cup of boiling water
- 1 regular or decaffeinated black tea bag

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- erythritol, stevia, or another sweetener, to taste (optional)
- Substitutions: Instead of black tea, you can substitute rooibos tea or honeybush tea.

Preparation

1. Place the cinnamon stick in a cup.
2. Add the boiling water and steep covered for 10 minutes.
3. Add the teabag. Steep for one to three minutes.
4. Sweeten to taste, if desired.

Antioxidant

In India, herbs and spices have been added to different types of food to impart flavor as well as to improve storage stability, since ancient times. The food industry to find natural antioxidants to replace synthetic compounds in food applications, and a growing trend in consumer preferences for natural antioxidants, which given more impetus to explore natural sources of antioxidants.

Anti-ulcer

The utilization of Cinnamon extract to inhibit both growth and urease activity of *H. pylori in-vitro* has in our hands proved to be more effective than thyme extract 10-11. The efficiency of *Cinnamon* extracts in liquid medium and its resistance to low pH levels may enhance its effect in an environment such as the human stomach.

Anti-microbial

Antimicrobial activity of *Cinnamon* bark. The volatile gas phase of combinations of *Cinnamon* oil and clove oil showed good potential to inhibit growth of fungi, yeast and bacteria.

Anti-diabetic

Anti-diabetic activity of *Cinnamon* in db/db transgenic mice¹⁴. This investigation reveals the potential of cinnamaldehyde for use as a natural oral agent, with both hypoglycemic and hypolipidemic effects. It also contain IR (Insulin Resistance), TTP (Thrombotic Thrombocytopenic Purpura) and GLUT4 (Glucose Transporter-4) in 3T3-L1 Adipocytes which controlled the diabetic condition of patient.

Anti-inflammatory

Anti-inflammatory activities and cytotoxicity against HepG2 (Human Hepatocellular Liver Carcinoma Cell Line) cells is due to essential oil of *C. osmophloeum* twigs has excellent, it also indicated that the constituents of *C. osmophloeum* twig exhibited excellent anti-inflammatory activities in suppressing nitric oxide production by LPS (Lipopolysaccharide)-stimulated macrophages.

Hepatoprotective Activity of Cinnamon

Preparation of the plant powder and extraction

The plant materials were obtained from the market dried shade of cinnamon bark is milled and extracted using ethanol 80 % in Soxhlet apparatus for 8 h (SLMIOP laboratories). Then, the extract was evaporated

to dryness and the final dry extract was stored in dark at -20 °C until used for the experiments. The percentage yield of extract was 17.7 % (w/w) of the initial raw material.

Animals

The experimental procedures were carried out in according to the guidelines of the Institutional Animal Ethics Committee in the clinical trials laboratories. The animals were observed daily for any signs of toxicity. Body weight was recorded at regular intervals throughout the experimental period. Adult male Wistar rats weighing 200-230g were used in the study. The animals were maintained in an air conditioned animal house at a temperature of 22 ± 2 °C, relative humidity of 57 ± 2 % and photocycle of 12:12 h light and dark. The animals were provided with standardized pelleted feed and drinking water and libitum.

BENEFITS OF CINNAMON IN HUMAN HEALTH

➤ **Blood Sugar Control** –It is therefore very popular with Type 2 diabetics who take it to control their blood sugar variations. Ceylon Cinnamon is particularly popular because it has low levels of Coumarin but in high dose it can cause liver damage.

➤ **Food Preservative** – Cinnamon is effective in inhibiting bacterial growth. This maybe one reason be why it is widely used in food industry. In addition to great flavor, Ceylon Cinnamon in combination with other spices like Turmeric and Chili may have been an indigenous solution to preserve food without a refrigerator.

➤ **Odor Neutralizer** – All you need is 2-5 drops of Cinnamon leaf oil mixed with water on a diffuser and within minutes all odors are neutralized. It also has the effect of improving your mood. Especially great as a cure for the winter blues.

➤ **Anti-Bacterial** - Cinnamon is a powerful anti-bacterial and makes a great natural disinfectant. Dilute it with water to disinfectant kitchen counter tops, sinks, your refrigerator, door knobs, toys and many other things.

➤ **Anti-oxidant** – With an ORAC value of 267536 $\mu\text{mol TE}/100\text{g}$ (USDA 2007) cinnamon is one of the top seven anti-oxidants in the world. Anti-oxidants reduces the formation of Free Radicals that cause cancer.

➤ **Cancer Preventer** –Cinnamon in its various forms have two chemical constituents called Cinnamaldehyde and Eugenol (From Cinnamon Oil). These have been used to develop nutraceuticals in this study that have been proven fairly effective in fighting Human Colon Cancer Cells (Eugenol) and Human hepatoma cells (Cinnamaldehyde).

➤ **Cognitive Development** – According this hard to verify German study cited in this article those taking Cinnamon improved their response times and memory recall. While not scientific, our personal experience suggests pretty good results in alertness and concentration.

➤ **Weight Reducer** – Cinnamon has the effect of thinning your blood thereby increasing blood circulation. Increased blood flow generally boosts your metabolism which is helpful in weight loss. This blood thinning property of Cinnamon also helps it in acting as an anti

- Clotting agent especially for those suffering from heart disease.
- **Nutrients** – Each 5g (1 teaspoon) of Cinnamon Powder has 833mg (41.6% DV) Manganese, 61.4g (6.1% DV) Calcium, 19mg (10.5% DV) Iron, and 1.425mg (2.35%). This data was calculated from this site.
- **Lowering LDL cholesterol & triglycerides** – According to a Mayo clinic article the only possible way Cinnamon could lower cholesterol is *indirectly* via how the body processes sugar and fat. But there is no direct effect on cholesterol.
- **Insect Repellent** – Again the anti microbial qualities of Cinnamon Leaf oil is often used for head lice treatment, black ant control, bed bugs, dust mites, and roaches. It is well known as a defense against Mosquito's.
- **Massage Therapy** – Cinnamon is a well known warming agent for relief pain.
- **Anti-Fungal** – Got a bad case of athlete's foot? It's powerful anti fungal properties is the perfect natural

alternative to killing the athlete's foot fungus.

- **Yeast infections** - Cinnamon has shown an amazing ability to stop medication-resistant yeast infections. This applies to Escherichia coli bacteria and Candida albicans fungus.

- **Irritable Bowel Syndrome (IBS)** – As a digestive cinnamon dramatically reduces the uncomfortable feelings associated with IBS especially the bloating. It does this by killing bacteria and healing infections in the GI tract and enabling the gastric juices to work normally.

- **Gum Disease and Tooth Decay** – Again the anti-bacterial properties of Cinnamon play a crucial role in getting rid of harmful bacteria without damaging your teeth or gums.

- **Cold, Sore Throat and Cough** – At the first sign (within 5-10 minutes) of sniffles or an itch in your throat take some Cinnamon Tea with Honey. It will stop an impending illness in its tracks, unless of course it is a viral infection that requires antibiotics.

Figure 1. Cinnamon plant



Figure 2. Terpinolene α -Cubebene α -Terpineol

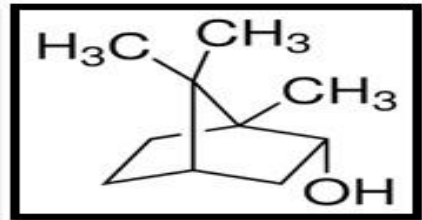
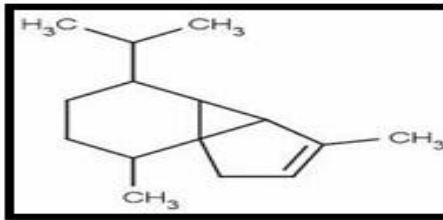
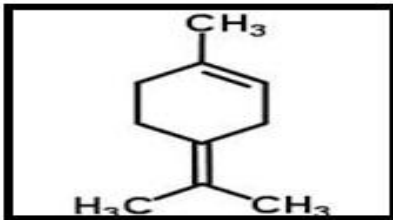


Figure 3. α -Thujene cinnamyl acetate β -caryophyllene

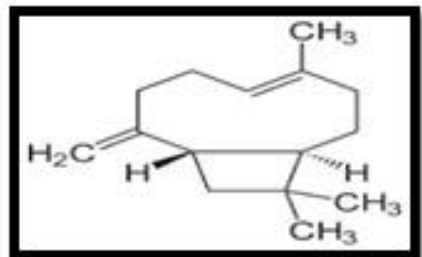
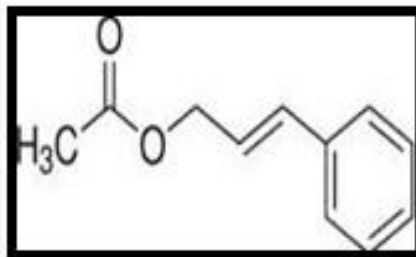
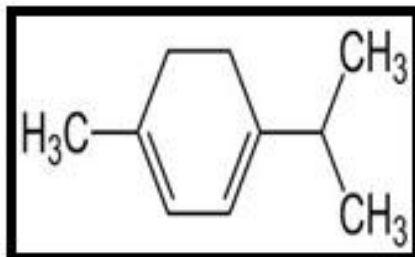


Figure 4. caryophyllene oxide Eugenol cinnamaldehyde

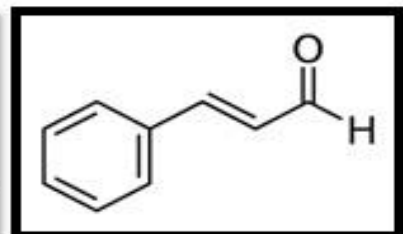
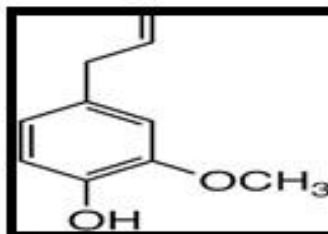
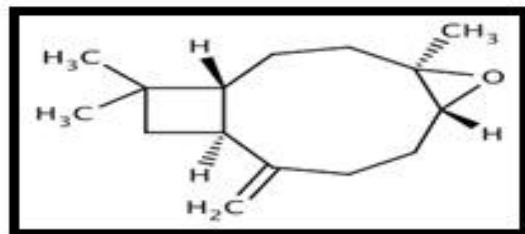


Figure 5. Cinnamic acid L-borneol E-nerolido

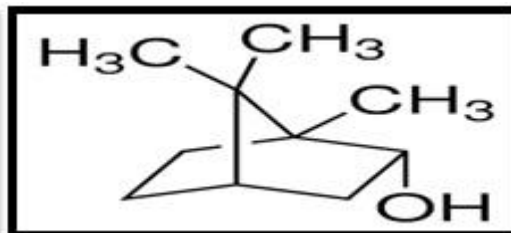
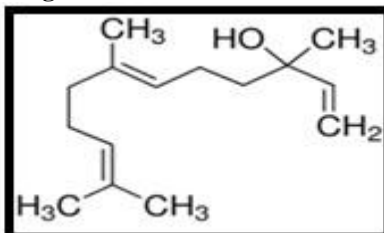
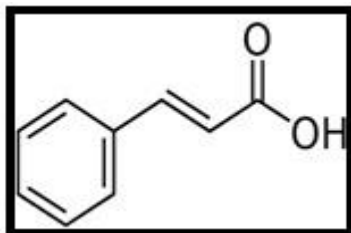


Figure 6. Cinnamom oil



Figure 7. Cinnamom tea



Figure 8. Cinnamom used as antimicrobial



Table 9. Chemical Constituents

COMPOUND	PART OF THE PLANT
Eugenol: 70.00 to 95.00%, Cinnamaldehyde: 1.00 to 5.00%	Leaves
Eugenol: 5.00 to 10.00% , Cinnamaldehyde: 65.00 to 80.00%	Bark
Camphor: 60.00%	Root bark
Caryophyllene (9.00 to 14.00%) and trans-Cinnamyl acetate (42.00 to 54.00%)	Fruit
alpha-Bergamotene: 27.38%, Terpene hydrocarbons: 78.00%	Buds <i>C. zeylanicum</i>
alpha-Copaene: 23.05% Oxygenated terpenoids: 9.00%	
rans-alpha-Bergamotene: 7.97% (E)-Cinnamyl acetate: 41.98%	Flowers <i>C. zeylanicum</i>
tCaryophyllene oxide: 7.20%	

CONCLUSION

Around all the plants found in India were used as medicinal. Apart from these the bark of *Cinnamomum* is widely used as a spice due to its distinct odour of essential oils. Main chemical constituents are Cinnamic acid, Cinnamaldehyde, Eugenol, and essential oils which having the hilarious medicinal property like anti-oxidant, anti-microbial, anti-ulcer, anti-inflammatory anti-diabetic, Massage Therapy ,Anti-Fungal, Irritable Bowel Syndrome, Gum Disease and Tooth Decay activity mentioned in the

article. In vivo study a Hepatoprotective Activity can be done in the Adult male Wistar rats.

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REFERENCES

1. AL Saghir MG, Babaei M, Abarghoei ME, Ansari R, Vafaei AA, Taherian AA et al. Antibacterial assay of *Cinnamomum cassia* nees ex blume bark and *Thymus vulgaris* L. leaf extracts against five pathogens. *Journal of Biological Sciences*, 9(3), 2009, 280-282.
2. Ayala-Zavala, JF, Gonzalez-Aguilar, GA and del- Toro-Sanchez, L. Enhancing safety and aroma appealing of fresh-cut fruits and vegetables using the antimicrobial and aromatic power of essential oils. *Journal of Food Science*, 74(7), 2009, 84-91.

3. Ayala-Zavala J, Oms-Oliu G, Odriozola-Serrano I, Gonzalez-Aguilar G, Alvarez-Parrilla E and Martin-Belloso O. Biopreservation of fresh-cut tomatoes using natural antimicrobials. *European Food Research and Technology*, 226(5), 2008, 1047-1055.
4. Dugoua JJ, Seely D, Perri D, Cooley K, Forelli T, Mills E, Koren G. From type 2 diabetes to antioxidant activity: a systematic review of the safety and efficacy of common and cassia cinnamon bark. *Can J Physiol Pharmacol*, 85, 2007, 837-847.
5. Salpeter SR, Buckley NS, Kahn JA, Salpeter EE. Meta-analysis: metformin treatment in persons at risk for diabetes mellitus. *Am J Med*, 121, 2008, 149-157.
6. Jitomir J, Willoughby DS. Cassia cinnamon for the attenuation of glucose intolerance and insulin resistance resulting from sleep loss. *J Med Food*, 12, 2009, 467-72.
7. Zhang EE, Liu Y, Dentin R, Pongsawakul PY, Liu AC, Hirota T, Nusinow DA, Sun X, Landais S, Kodama Y, Brenner DA, Montminy M, Kay SA. Cryptochrome mediates circadian regulation of cAMP signaling and hepatic gluconeogenesis. *Nat Med*, 16, 2010, 1152-1156.
8. M. Harada, Y. Hirayama, and R. Yamazaki, Pharmacological studies on Chinese cinnamon. V. Catecholamine releasing effect of cinnamaldehyde in dogs. *Journal of Pharmacobio-Dynamics*, 5(8), 1982, 539-546.
9. YL Xue, HX Shi, F Murad and K Bian, Vasodilatory effects of cinnamaldehyde and its mechanism of action in the rat aorta. *Vascular health and risk management*, 7, 2011, 273-280.
10. H. M. El-Bassossy, A. Fahmy, and D. Badawy. Cinnamaldehyde protects from the hypertension associated with diabetes. *Food and Chemical Toxicology*, 49, 2011, 3007-3012.
11. Rahman S, H Begum, Z Rahman, F Ara, MJ Iqbal and AKM Yousuf. Effect of cinnamon (*Cinnamomum cassia*) as a lipid lowering agent on hypercholesterolemic rats. *Journal of Enam Medical College*, 3(2), 2013, 94-98.
12. Ciftci M, UG Simsek, A Yuce, O Yilmaz and B Dalkilic. Effects of dietary antibiotic and cinnamon oil supplementation on antioxidant enzyme activities, cholesterol levels and fatty acid compositions of serum and meat in broiler chickens. *Acta Veterinaria Brno*, 79(1), 2010, 33-40.
13. Fred Czarra. Spices: A Global History. Reaktion Books (May 1, 2009) ISBN 978-1861894267.
14. Haley Willard for the Daily Meal. December 16, 2013 Cinnamon-Flavored Liquors for the Holidays.
15. National Center for Complementary and Alternative Medicine (NCCAM). Created: October 2011. Updated: April 2012 Herbs at a Glance: Cinnamon NCCAM Publication No 463.
16. Harris, Emily. German Christmas Cookies Pose Health Danger. National Public Radio. Retrieved May 1, 2007.
17. Guardian newspaper: Cinnamon sparks spicy debate between Danish bakers and food authorities, 20 December 2013.
18. "USDA nutritional information for ground cinnamon". United States Department of Agriculture. Retrieved November 8, 2014.
19. Cinnamon. Oxford English Dictionary (2nd ed.). Oxford University Press., also Harper, Douglas. "cinnamon". Online Etymology Dictionary. 1989.