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REVIEW ON PHYTO-CHEMICAL AND PHARMACOLOGICAL ACTIVITIES ON CINNAMALDEHYDE ZEYLANICUM

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Abstract:

This review paper involves medicinal uses and pharmacological survey of cinnamaldehyde zeylanicum and belonging to family Lauraceae. The plant has been used traditionally in middle east, south east asia as anti-bacterial, anti-diabetic and anti-fungal. One of the well known representatives of this Genus; cinnamomom . It is widely distributed in different parts of the world and long history traditional medicinal uses. The primary phytoconstituents of cinnamon are,cinnamaldehyde ,cinnamic acid, cinnamyl alchohol,eugenol,coumarin,essential oil,flavonoids and polyphenols. its pharmacological activities are,anti-microbial activity,anti imflammatory activity,anti-oxidant activity,anti-diabetic activity,cardio protective activity, neuro protective activity,anti-cancer activity and gastro protective activity.

***Key Words**: Cinnamon Zeylanicum,Essential Oil,Anti Diabetic,Anti Bacterial.*

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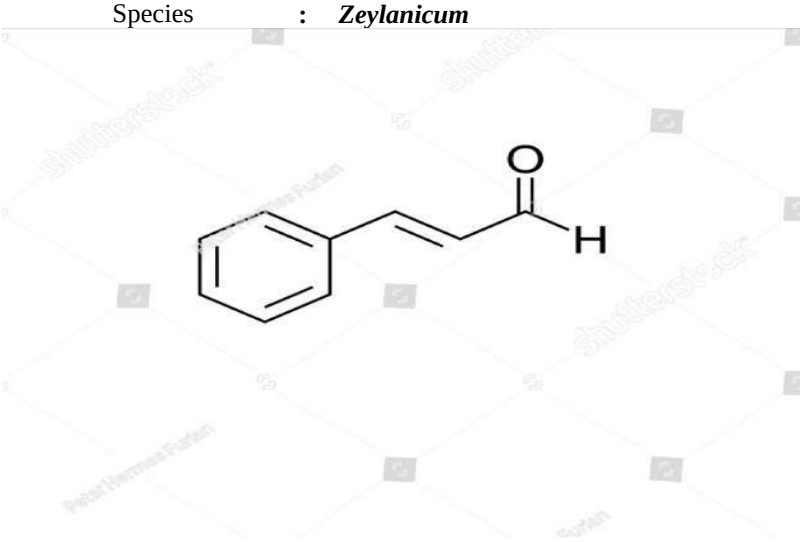
INTRODUCTION:

There are over 250 plant species in the cinnamon genus. But only 4 types or varieties of Cinnamon are used for commercial purposes. Such as, 1. *Ceylon cinnamon* (*Cinnamon zeylanicum* Blume.) 2. *Cassia cinnamon* (*Cinnamomum aromaticum*) 3. *Korintje cinnamon* (*Cinnamomum burmanni*) 4. *Saigon cinnamon* (*Cinnamomum loureiroi*) [1] *Cinnamomum zeylanicum* Blume also known as *Ceylon cinnamon* belongs to the Family Lauracae. The main part of its tree which is used for the spice purpose is its bark.[2] This is one of the oldest and most important spice crops used for culinary purposes in Sri Lanka for centuries.[3] With the exception of *C. zeylanicum*, Cassia, Saigon and Korintje Cinnamon are also classified under the *C. zeylanicum* category because they are very similar to each other with only slight variations in color, taste, shape and Coumarin content.[4] All Cassia type Cinnamon are hard and have high levels of Coumarin a substance known to cause liver damage, while Ceylon Cinnamon is the only soft and brittle Cinnamon with ultra-low Coumarin levels.[5]

Taxonomical Classification [6]

Kingdom	:	Plantae
Division	:	Tracheophyta
Class	:	Magnoliopsida
Order	:	Laurales
Family	:	Lauraceae
Genus	:	***Cinnamomum***
Species	:	***Zeylanicum***



Chemical structure of cinnamaldehyde

Vernacular Names [7]

Language	**:**	**Vernacular Name**	**Language**	**:**	**Vernacular Name**
Telugu	:	Dalchina Chekka	**Urdhu**	**:**	Dalchini
Kannada	:	Dalchinni	**Sanskrit**	**:**	Darusita
Tamil	:	Karuva/ Ilavangam	**Sinhala**	**:**	Kurundu
Hindi	:	Dalchini			

Plant synonyms [8]

- *Ceylon cinnamon*
- *True cinnamon*
- *Mexican cinnamon*

Geographical Distribution

Cinnamon is found widely in Sri Lanka but also grows in Malabar, Cochin-China, Sumatra and in Eastern Islands too. Besides India, it is also cultivated in Brazil, Mauritius, India, Jamaica and in other countries also. [9]

Botanical Description

C. zeylanicum Blume), a moderate sized or large tree with a rather thick, reddish bark, glabrous young parts and finely silky buds. [10]

Morphological Characteristics [11,12,13,14]

Leaves

Simple, opposite or sub-opposite without stipules, variable in size, 7.5-25cm long, oval or lanceolate-oval, subacute at base, slightly acuminate, obtuse, glabrous, stiffy coriaceous, strong, 3 or 5-nerved with fine, reticulate venation, shining above, slightly paler beneath, bright pink when young, petioles 1.2-2.5 cm long, stout, flattened above.

Flowers

Regular, bisexual or monoecious, pale yellow, small, numerous on rather long, slightly pubescent pedicels in subterminal panicles longer than leaves, lax peduncles often clustered, glabrous or pubescent, bracts absent; perianth about 0.6 cm long, silky, tube shortcampanulate, segments 6, oblong-lanceolate, acute or obtuse, usually persistent, imbricated in two rows; stamens 9 in three rows, perigynous, anthers 4-celled, filaments of the first and second rows without glands and filaments of the third row with glands, staminodes 3, sagittate forming the fourth row; ovary superior, unilocular with a solitary ovule pendulous from the top, style shorter than stamens, stigma bilobed.

Fruit

Fruit about 1.2 cm long, oblong-ovoid, surrounded by much enlarged perianth, dry or fleshy, dark purple, seed without endosperm.

Bark: Inside filled with thin concentric layers composed of multiple layers rolled like cigarquill with Golden brown color.

Ethno- Botanical Uses

Medical Uses

Ceylon cinnamon is considered as an alternative treatment for diabetes mellitus. In one study, Ceylon cinnamon brought insulin levels in diabetic rats to close to normal levels. Other studies Trusted Source support the idea that *C. cinnamon* is useful for diabetes treatment.

It enhanced antioxidant enzyme activity. This means it may prevent or treat certain types of cancer.

According to Unani System of Medicine Dalchini (Cinnamon) shows following properties.

- Antiseptic • Exhilarant
- Absorbent • Aphrodisiac
- Stimulant • Stomachic
- Demulscent • Liver Toni
- Deobstruent • Tonic for organs Principle
- Emmenagogue • Diuretic

Analysis of essential Oils by thin layer Chromatography [15, 16, 17]

Thin layer chromatography

TLC is performed for identification, for that solutions were prepared .

Stationary Phase

Ppre-coated TLC plate by silica gel 60 of Gf 254 was prepared.

Sample Preparation

A small amount of extracted cinnamon oil was dissolved in methanol/acetone in a test tube.

Mobile Phase

A mixture of Hexane and Ethyl acetate in the of 6:4 ratio (6ml and 4ml respectively) was prepared and transferred into a test tube. For better separation, a solvent system consisting of toluene: ethyl acetate: formic acid (19:1:0.1) ratio was used. All this prepared solutions were wrapped with Aluminium foil.

Spraying Reagent

The spraying reagent was prepared as follows: 0.5 mL anisaldehyde was added to10 mL glacial acetic acid, followed by20 mL methanol, and finally 5 mL concentrated sulfuric acid (H_2SO_4) .The solution was mixed carefully to obtain a homogeneous spraying reagent.

Principle (Based on Polarity)

Thin Layer Chromatography (TLC) separates compounds based on their polarity and their interaction with stationary and mobile phases:

The stationary phase (silica gel) is polar in nature.The mobile phase can be non-polar to moderately polar, depending on solvent composition.Non-polar compounds travel faster (higher Rf value) because they interact less with the polar stationary phase.Polar compounds move slower (lower Rf value) due to stronger adsorption on silica gel.

In this experiment:

Cinnamaldehyde is moderately non-polar, so it moves upward with the mobile phase and forms a distinct spot.

Procedure
A pre-coated silica gel TLC plate was taken, and a baseline was drawn lightly with a pencil about 1–2 cm from the bottom.
Two points were marked equidistantly on the baseline:
Point A: for the standard solution (cinnamaldehyde)
Point B: for the sample extract
Using a capillary tube, small and concentrated spots of:
Standard solution were applied at point A
Sample solution were applied at point B

The spots were allowed to dry to avoid diffusion. The TLC plate was carefully placed in a TLC chamber containing the prepared mobile phase. The solvent level was maintained below the baseline. The chamber was kept closed to maintain saturation of solvent vapors.

As the solvent ascended the plate by capillary action, separation occurred based on differences in polarity:
Less polar components moved faster with the solvent front. More polar components remained closer to the baseline .The development was stopped when the solvent front reached about 3/4th of the plate height .The plate was removed and the solvent front was immediately marked with a pencil, then allowed to dry. If spots were not visible under normal light, the plate was sprayed with the anisaldehyde–sulfuric acid reagent. The plate was then heated on a hot plate at 100°C for a few minutes to develop the colour.

Observation
Yellow-colored spots appeared corresponding to cinnamaldehyde.
Matching spots at similar positions in both sample and standard indicate the presence of the compound.

Result / Conclusion [18-25]
The presence of cinnamaldehyde in the sample was confirmed by:
The appearance of yellow spots on the TLC plate.

Pharmacological Activities
Vaibhavi Jakhetia 2010

Antioxidant [21-25]
Shahidi et al. have reported that antioxidants are often added to foods to prevent the radical chain reactions of oxidation, and they act by inhibiting the initiation and propagation step leading to the termination of the reaction and delay the oxidation process 3. However, Madhavi and Salunkhe have reported that the commonly used synthetic antioxidants such as butylated hydroxyanisole (BHA) and butylated hydroxy toluene (BHT) are restricted by legislative rules because of doubts over their toxic and carcinogenic effects 4. Therefore, there has been a considerable interest in the food industry to find natural antioxidants to replace synthetic compounds in food applications, and a growing trend in consumer preferences for natural antioxidants, all of which has given more impetus to explore natural sources of antioxidants.
Varsha J. Bansode, Green Pharmacy

Anti-ulcer [21-29]
In sum, 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. 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 reported by Tabak et al.
Jiageng Guo [30]

Anti-microbial
Matan et al. have reported Anti-microbial activity of Cinnamon bark. The volatile gas phase of combinations of Cinnamon oil and clove oil showed good potential to inhibit growth of spoilage fungi, yeast and bacteria normally found on IMF (Intermediate Moisture Foods) when combined with a modified atmosphere comprising a high concentration of CO 2 (40%) and low concentration of O 2 (<0.05%).
Xinya Jiang [31, 32]

Anti-diabetic
Sung Hee et al. have reported data of anti-diabetic activity of Cinnamon in db/db transgenic mice 14. It has been shown by Subash et al. that oral administration of cinnamaldehyde produces significant antihyperglycemic effect lowers both total cholesterol and triglyceride levels and, at the same time, increases HDL-cholesterol in STZ-induced diabetic rats. This investigation reveals the potential of cinnamaldehyde for use as a natural oral agent, with both hypoglycemic and hypolipidemic effects.

Shidu Yana
Anti-inflammatory [33-35]
Tungetal demonstrated that essential oil of C.osmophloeum twigs has excellent anti-inflammatory activities and cytotoxicity against HepG2 (Human Hepatocellular Liver Carcinoma Cell Line) cells. Furthermore, 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

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