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DEVELOPMENT OF A CARBONATED BEVERAGE FLAVOUREDWITH

CINNAMOMUM ZYLINICUM

BY

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Dedicated to To My Mother and Late Father

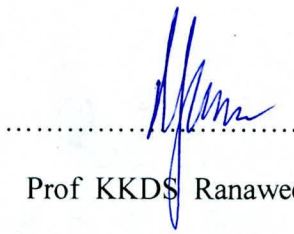
Wife Brothers sister & daughter selini.

DECLARATION

The work described in this thesis was carried out by me under the supervision of Prof KKDSRanaweera(Department of Food science and technology University of Sri Jayawardenapura),report on this thesis has not been submitted in part of any institution for another degree.

(D.G. Angammana)

I/We names of the supervisors certify that above statement made by the candidate is true and that this thesis is suitable for submission of the university for the purpose of evaluation.



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Development of a Carbonated beverage using a *CinnamomumZylinicum*

Abstract

Aqueous extracts of *CinnamomumZylinicum*have Catachin type chemical constituents which are known to reduce the blood glucose level of type 2 diabetes mellitus. In addition, they have a capacity of reducing the Low Density Lipoproteins (LDL) level and hence reduce the cardio vascular decease. Cinnamon was used to make a carbonated beverage.

Cinnamon water was extracted, spray dried and the powder was assessed by HPLC analysis for the total Poly phenol Content. Aroma of cinnamon was isolated and GC-MS analysis were carried out. Major fragrance constituents were identified and quantified. Trace chemical constituents like Coumerine, Styrine, Safrole were identified and quantified. It is shown that a very lower amount of above carcinogenic chemical constituents was present in the *CinnamomumZylinicum*

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CHAPTER 1

1.1 INTRODUCTION

Cola is a carbonated beverage that is popular among the communities worldwide, cola is most of the time typically flavoured with kola nut flavour (*cola nitida*) and other flavors obtained usually from natural sources. Trace flavoring is also used for cola to obtained distinctive tastes such as lemon oil, Lime oil, Grape fruit oil, Almond oil etc, in present studies main flavour is Cinnamon oil and trace flavourent added for the purpose of smoothing the distinctive drink.

Cola acuminate and *Cola nitida* two cultivated species. these are tropical African evergreen trees, quite similar to each other. The Cola nuts of commerce are these reddish, nut like seeds, which are rich in the chemicals of Caffeine and theobromine.The seeds are chewed as a stimulators by local populations, for a practice carried out in West Africa for thousands of years.The seeds have been traded to other countries since at least 14^{th} century ,and are exported for commercial use in soft drinks and pharmaceutical medicine. Earnest small 2010.

Sweeteners use for cola are usually a high fructose corn syrup, table sugar or artificial sweetener may be used around worldwide for cola production but in many causes in carbonated beverages approved nutritive sweeteners may be used consistent with (GMP).Among non nutritive sweeteners sucralose is suitable ingredient which does not affect, blood glucose level in humen.The cola formulation in present study contains sucralose.

Any way Open Cola formulations now are popular among the Cola consumers and in Open Cola formulations there is no need to use true Kola nut extract but similar or best fit flavor can be used, therefore our Cinnamon Cola of the present studies can be categorized into the Open Cola category because no kola nut extract is used as an ingredient of present studies.

Usually caffeine added to the Cola as a body stimulant, which refreshes the consumer's body and prevents sedative action but in the present studies caffeine is not added as it is intended to reassessment for diabitics.

Colouring like caramel or natural Cinnamon colour can be used for cola drink. but Cinnamon water has a colour as same as caramel colour when it is dissolved in a water, hence if the colour needed to intensify caramel colour can be used.Phosporic acid is usually used to the cola beverage to balance the acidity

In open cola formulations recipe can be changed as per the requirement.

1.2 OBJECTIVES

The present study has the following objectives focusing on the development of Cinnamon based cola.

Major

1.Develop a value added product using natural Sri Lankan Cinnamon which has health benefits to the consumers worldwide. Particularly for the type 2 diabetic mellitus.

Minor

2. Identify & Quantify major chemical constituents of aroma of Cinnamon (*Note:*Cinnamon oil prepared under step of aroma recovery in methodology) using Gas Liquid Chromatograph couple with mass spectrometer machine.(GC-MS-MS)

3. Identify and quantify constituents of water extract of Cinnamon (Cinnamon water soluble, non volatile chemical constituents) using High Performance Liquid Chromatograph machine (HPLC)

4.Studies of toxicology of Cinnamon.

5.Sensory evaluation of final beverage & prove as a commercially viable product.

CHAPTER 2

2.LITERATURE REVIEW

Cinnamon tree is found in most of the Asian continents like Sri Lanka,India,Java & Sumatra ,Indonesia etc.Inner bark of Cinnamon is highly demanded in European and rest of the worlds continents. This is a salient spice use as a food flavoring in the world It was so highly prized among ancient nations that it was regarded as a gift fit for monarchs and even for a god. a fine inscription records the gift of Cinnamon and Cassia to the temple of Apollo at Miletus. Though its source was kept mysterious in the Mediterranean world for centuries by the middlemen who handled the spice trade, to protect their monopoly as suppliers, Cinnamon is native to Bangladesh, Sri Lanka, Malabar Coast of India and Burma.

The Roman poet Martial made fun of Romans who drip unguents, smell of cassia and Cinnamon taken from a bird's nest, and look down on him who does not smell at all.

Ancient time in Sri Lanka there was a traditional Cinnamon production for own consumption. Portuguese traders landed in Ceylon at the beginning of the 16th century and restructured the traditional production and management of Cinnamon by the Sinhalese, who later held the monopoly for Cinnamon in Ceylon. The Portuguese established a fort on the island in 1518 and protected their own monopoly for over a hundred years. (Braudel 1984, page. 215)

Dutch traders finally dislodged the Portuguese by allying with the inland Kingdom of Kandy. They established a trading post in 1638, took control of the factories by 1640, and expelled all remaining Portuguese by 1658. "The shores of the island are full of it", a Dutch captain reported, "and it is the best in all the Orient. when one is downwind of the island, one can still smell Cinnamon eight leagues out to sea." (Braudel 1984, page. 215)

The Dutch East India Company continued to overhaul the methods of harvesting in the wild and eventually began to cultivate its own trees. In 1767, Lord Brown of East India Company established Anjarakkandy Cinnamon Estate near Anjarakandy in Cannanore (now Kannur) district of Kerala, and this estate became Asia's largest Cinnamon estate.

The British took control of the island from the Dutch in 1796. However, the importance of the monopoly of Ceylon was already declining, as cultivation of the Cinnamon tree spread to other areas, the more common cassia bark became more acceptable to consumers, and coffee, tea, sugar, and chocolate began to outstrip the popularity of traditional spices.

Among the varieties of Cinnamon Sri Lankan Cinnamon has a highly demand than other varieties since it has extraordinary quality which contained high Cinnamaldehide content and low Coumarin content .Cinnamaldehide is a major responsible constituent of it aroma.Coumarin is constituent which known to be carcinogenic to the human body, Cassia contained rather higher level of Coumarin.

Cinnamon has a many of important Catachin type chemicals, those will definitely give a health benefits to the consumers. Reduces the blood glucose level of mellitus diabetics patients, blood pressure, cardiovascular decease, prevent risk of cancer through it anti oxidant activity.

2.1 BOTANY OF CINNAMON.

2.1.1 Family : Lauracea

2.1.2 Botanical name.

Cinnamomum verum ("true Cinnamon", Sri Lanka Cinnamon or Ceylon Cinnamon)

2.1.3 SYNONYMS

Cinnamomum zylinicum : CZ ("true Cinnamon", Sri Lanka Cinnamon or Ceylon Cinnamon)
Cinnamomum burmannii :(Korintje, Padang Cassia, or Indonesian Cinnamon)
Cinnamomum loureiroi : (Saigon Cinnamon,Vietnamese Cassia or Vietnamese Cinnamon)
Cinnamomum cassia :(Cassia or Chinese Cinnamon)

2.1.4 VERNACULAR NAMES.

The several different cultivars of *Cinnamomum verum* are based on the taste of bark:

Table 1 chapter 2

Type	Sinhala Name	In Sinhala
1	*Pani kurundu/Mapat Kurundu/ Pat Kurundu*	පැණි කුරුඳු/ මාපත් කුරුඳු/ පත් කුරුඳු
2	*Naga Kurundu*	නාග කුරුඳු
3	*Pani Miris Kurundu*	පැණි මිරිස් කුරුඳු
4	*Weli Kurundu*	වැලි කුරුඳු
5	*Sewala Kurundu*	සෙවල කුරුඳු
6	*Kahata Kurundu*	කහට කුරුඳු
7	*Pieris Kurundu*	පීරිස් කුරුඳු

English : korunda

Tamil : karuva

European languages (Latin) : cannella

2.1.5 DISTRIBUTION

Cinnamon is native to Bangaladesh, Sri Lanka, Malabarcoast of India and Burma. Its commonly formed in tropical areas such as down south of Sri Lanka but it is also common in upcountry although cooled and dry weather is existing. Quality of Cinnamon is dependent upon a destination of cultivate.

2.2 THE PLANT

Tropical evergreen plant. Almost every part of the Cinnamon tree including the bark, leaves, flowers, fruits and roots, has some medicinal or culinary use, See picture 2 page 38.

2.3 CONSTITUENTS.

CZ, also known as Ceylon Cinnamon (the source of its Latin name, Zeylanicum) or 'true Cinnamon' is indigenous to Sri Lanka and southern parts of India . Three of the main components of the essential oils obtained from the CZ bark of are trans-Cinnamaldehyde, Eugenol, and Linalool, which represent 82.5% of the total composition . Trans-Cinnamaldehyde, accounts for approximately 49.9–62.8% of the total amount of CZ bark oil.Cinnamon water