

Extraction and characterization of Hydroxy Citric Acid from *Garcinia cambogia* cultivated at two different locations of Malabar and Srilanka

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Abstract

Obesity is one of the major problems faced by many people all around the world. There are many ways to reduce it physically, but it needs some hard work. Hydroxy citric acid (HCA) is the compound which is used to reduce weight. This compound is abundantly present in the fruits of *Garcinia cambogia*. This is a type of tamarind which is cultivated in Srilanka and also in some parts of Malabar in India. The purity and yield of HCA varies between *G. cambogia* cultivated at different locations. It is very important to extract HCA with maximum purity and with higher yield to benefit the mankind. Hence, in the present research work, HCA was extracted from *G. cambogia* cultivated at two different location of Malabar and Srilanka and compared their elements and purity using HPLC and FTIR. The purity of HCA extracted from *G. cambogia* cultivated at Malabar was found to be higher of about 50.95% in comparison with HCA extracted from *G. cambogia* cultivated at Srilanka which was 41.16%.

Keywords: Hydroxycitric acid, *Garcinia cambogia*, High performance Liquid chromatography (HPLC), Fourier transforms infrared spectroscopy (FTIR).

1. Introduction

Garcinia cambogia (Family: Guttiferae) commonly known as Malabar tamarind is produced from a small or medium sized tree with a rounded crown and horizontal or drooping branches. Hydroxy Citric Acid (HCA) is one of the major constituent found in the fruits of *G. cambogia* and the plant also contains various chemical constituents such as Xanthenes, Benzophenones and plant acids like Maleic acid, Citric acid etc. Traditionally its dried fruits are used as antiobesity agent to reduce the cholesterol level. HCA is naturally occurring fruit acid found in the outer layer covering of the fruits of *G. cambogia* and it possesses the antiobesity activity [1,2]. In recent studies it has been found to be the metabolic regulator of obesity in human system.

HCA is highly unstable and therefore extracted as a salt of calcium or potassium. In the present work *G. cambogia* cultivated from two different places viz., Malabar and Srilanka was used to isolate, identify and determine the content and purity of HCA by using FTIR and chromatographic techniques.

2. Materials and Methods

2.1 Materials

G. cambogia cultivated at Malabar and Srilanka was purchased from a dealer at Coimbatore, Tamilnadu, India. The fruit was dried in hot air oven at 160°C for 31 minutes and grinded in to pieces with a grinder. The dried grinded fruit was further weighed and extraction studies were conducted. Other chemicals used in the experiment were of highest purity and of analytical grade. The yield

and purity of extracted HCA was measured using High Performance Liquid Chromatography (HPLC) (Agilent 1220 Infinity) and Fourier transform infrared spectrophotometer (FT-IR) (ABB Boomen MB 3000).

2.2 Extraction of HCA

150 g of dry *G. combogia* was taken and stirred with 750mL of distilled water using mechanical stirrer for 30 min. The solution was filtered using Whatman filter paper No.1 and the filtrate was collected. The filtrate was mixed with 1 N calcium hydroxide solution and stirred using magnetic stirrer until the pH reached 7.0. Calcium salt of HCA precipitated out and collected by subsequent filtration and dried in hot air oven to get salt of Calcium hydroxy citrate. Similar procedure was followed for HCA extraction from *G. combogia* cultivated at two different locations and the quantity of HCA extracted was noted.

2.3 Characterization of HCA

The extracted HCA from *G. combogia* cultivated at two different locations were subjected to elemental analysis using FTIR for characterization studies and were compared.

2.4 Estimation of purity

The purity of the HCA compound extracted from *G. combogia* cultivated at two different locations was estimated using the HPLC method.

2 mg/ml concentration of solutions were prepared from standard HCA and *G. combogia* fruit extract in 0.01N sulfuric acid and passed through cation exchange resin to get free acid. 20 μ l solutions of standard and test were injected in RP-HPLC instrument using C18 column as stationary phase and 0.01N sulphuric acid as mobile phase at a flow rate of 1.0ml/min with UV detection at 210 nm [3,4]. The percentage content of HCA in fruit extract was calculated using HPLC chromatogram peak area in comparison with working standard.

3. Results and Discussion

The quantity of calcium salt of HCA extracted from *G. cambogia* rinds cultivated from Malabar and Srilanka was found to be 52.8 g and 47.6 g respectively. The *G. cambogia* rind cultivated from Malabar gave higher yield compared to Srilankan rind. Further, the HCA extracted was subjected to FTIR and HPLC analysis.

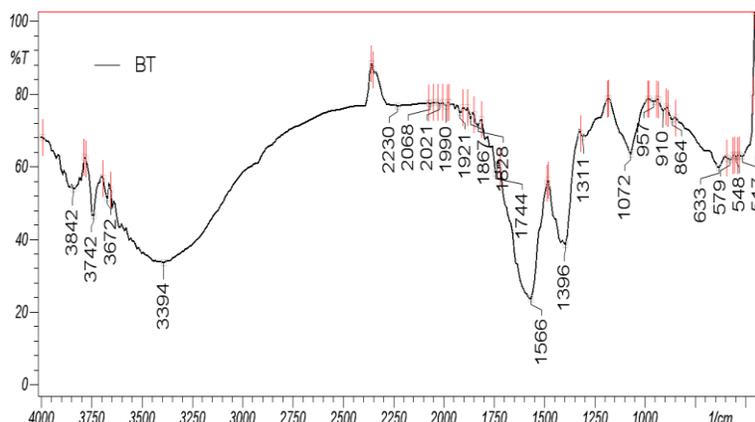


Fig 1: FTIR spectrum of HCA extracted from *G. cambogia* cultivated at Malabar

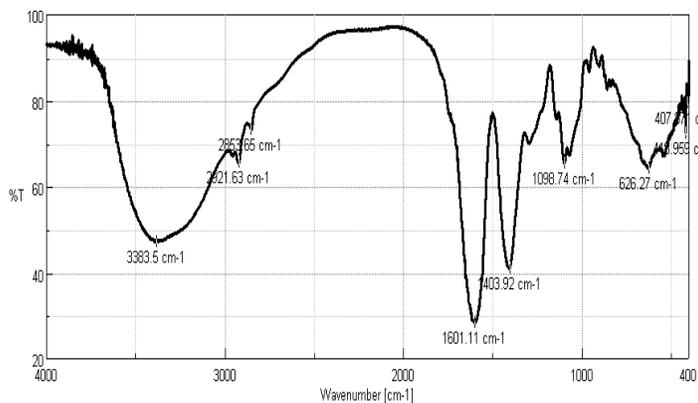


Fig 2: FTIR spectrum of HCA extracted from *G. cambogia* cultivated at Srilanka

The FTIR spectrum of HCA extracted from *G. cambogia* rind from Malabar and Srilanka showed similar

pattern at wave number between 1600 and 1070 cm^{-1} that confirmed the presence of HCA.

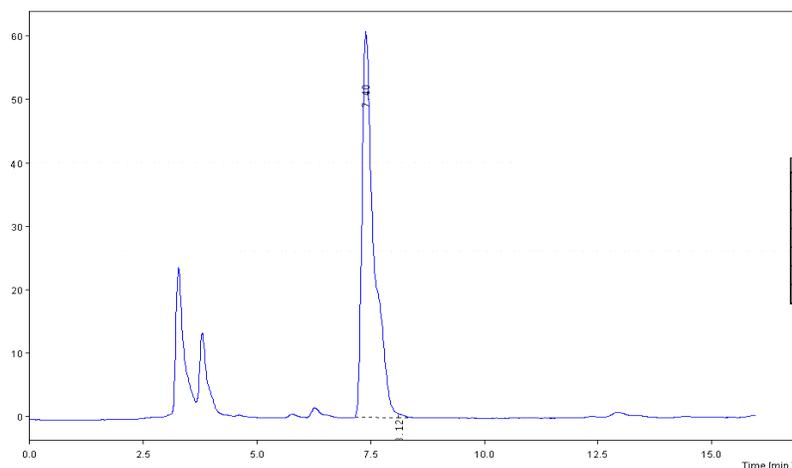


Fig 3: HPLC chromatogram of HCA extracted from *G. cambogia* cultivated at Malabar

The peak observed at the retention time of 7.40 min confirmed the presence of HCA compound extracted from *G. cambogia* rind from Malabar and the peak area was

noted and purity was calculated in comparison with standard and found to be 50.95%.

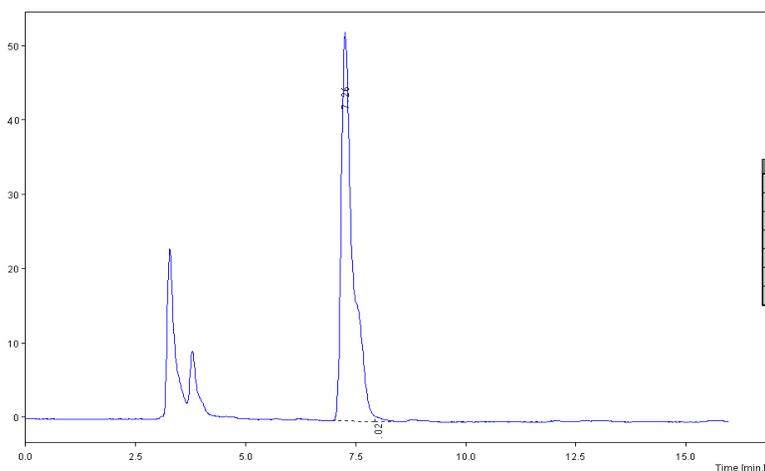


Fig 4: HPLC chromatogram of HCA extracted from *G. cambogia* cultivated at Srilanka

The peak observed at the retention time of 7.26 min confirmed the presence of HCA compound extracted from *G. cambogia* rind from Srilanka and the peak area was noted and purity was determined to be 41.16%.

The peaks present at other retention times may correspond to some other compounds that are present in the rind.

Hence, the yield and purity of HCA extracted is higher from *G. cambogia* cultivated at Malabar compared to *G. cambogia* cultivated at Srilanka.

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