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UV, FT-IR, and GC-MS analysis of *Caralluma fimbriata*

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Abstract
Medicinal plants have performed a very important role in medicine production. The plant extracts directly has demonstrated to be safe. In the present studies, examines the activity of Caralluma group comparing it with placebo group. The patented extract of *Caralluma fimbriata*, plant helps to reduce the weight. This study was elongated by analyzing the effective bioactive compounds of extract of *Caralluma fimbriata* using UV- Visible spectrophotometer, Fourier transform infrared spectrometer (FTIR) and Gas chromatography-mass spectrometry (GC-MS). The analysis of *Caralluma fimbriata* shows the increased activity in Caralluma group then comparing to placebo group. Hence, it is widely used in various treatments especially in maintaining the body weight.

Keywords: *Caralluma fimbriata*, UV, FTIR, GCMS, antiobesity property

Introduction
Caralluma fimbriata an eatable sempervia cactus is a perennial herb, 20-30 cm tall developing in dry parts of Tamil Nadu, India [1]. It is a boundless miniature stem succulent that occurs throughout Western Africa, Southwest Asia and the Indian subcontinent [2]. Genus caralluma comprises about 200 genera and 2500 species [3]. It belongs to Family *Apocynaceae* is widely employed as Appetite suppressant and thirst quencher among tribal population.
Sempervia cactus has broad range of application traditionally as hunger suppressant. Caralluma is used both in appetite suppression and supplementation for lowering weight [4, 5, 6]. It is recently arrived in the family of sempervia plants that are becoming more and more popular for their appetite suppressant and weight loss properties. Caralluma has antioxidant and antidiabetic action aside from the role of appetite suppressant.
Obesity is due to excessive body fat that may lead to several health problems. Obesity and Body mass index (BMI) Correspond with an increased risk of Cardio vascular diseases (CVD) and related diseases and death rate [7, 8, 9]. The *Caralluma fimbriata* were subjected to UV, FTIR, GCMS. The caralluma group is then compared to placebo group for antiobesity property. *Caralluma fimbriata* are involved in medicinal uses regarding treatment of Rheumatism, Diabetes, Leprosy, Antiseptics, and Disinfectants [10].

Materials and Methods
Materials
Caralluma fimbriata plant extracts, mesh sieve.

Methods
Collection of the extract
Caralluma fimbriata were collected from various places of south India. Then it was authentified by professor jayaraman, plant anatomy research centre, Chennai, Tamil Nadu.

Preparation of the extract
The plant was collected, washed and dried. Then it was grinded in a grinding machine to fine powder and proceeded through a mesh sieve. The extract were then weighed and stored at room temperature.

Placebo group or control group
A control group is an experimental condition that does not receive the actual treatment and may serve as baseline. A placebo pill is a sugar pill is used in this medication study. It is used to calculate the difference between groups due to the active medicine or the participant perception is the placebo effect.

UV-visible spectra analysis of *Caralluma fimbriata*

The various volumes of *Caralluma fimbriata* plant extract including 1.0, 2.0, 3.0, 4.0 and 5.0 ml were added to the constant volume of ferrous sulphate solution at different pH conditions (2.0, 3.0, 5.0, 8.0 and 9.0). The optimization of physiochemical parameters including volume of plant extract and pH was done using UV-visible spectrophotometer (Jasco V650) in the range of 200–400 nm. During the synthesis of phytochemicals, both the Ethanolic extract and the precursor salt solution were mixed in 1:5 proportions, after the addition of leaf extract to the salt solution, the color changed from colorless to black. The reaction mixture was centrifuged at 10,000 rpm for 15 min.

FT-IR analysis of *Caralluma fimbriata*

FTIR spectra were recorded with the Bruker-Tensor 27 Fourier Transform spectrometer equipped with a RT-DL a TGS detector. Each measurement was recorded in transmittance (ratio1:100,sample:KBr) in the range 4000–400cm^{-1} and average value of 128 co-added scans, with 4cm^{-1} resolution and 4mm aperture, at room temperature. The spectra were registered and as cribbed using Opus software, version 6.0.

GC-MS analysis of *Caralluma fimbriata*

GC-MS analysis on the extract of *Caralluma fimbriata* was carried out in the Green chem., Bangalore. Perkin Elmer GC Clarus - 580 with Headspace sampler (Turbomatrix) and gas chromatograph interfaced to a mass spectrometer (GC-MS) instrument was used in employing the following conditions: Column Elite 5 – Size: 30m (a film thickness of 0.5mm; Nitrogen is used as a carrier gas at a constant flow of 1 ml/min at split ratio of 1.5. Then it is detected by using Flame ionization detector at about 275.0℃. Then inject 1µl volume of solution through injection port. During injection, the port is maintained at about 250℃. The initial temperature of column oven is about 80℃.

Sample preparation

Weigh accurately 50 mg extract of *Caralluma fimbriata* and 50 ml of acetone in water bath for 10-15 min at 40℃. Filter the solution and concentrate upto 10 ml. Transfer 2 ml of solution to a GCMS vial and inject the solution.

Result and Discussion

UV-Visible Spectroscopy

UV-Visible Spectroscopy (UV-Vis) refers to absorption spectroscopy in the UV-Visible spectral region. This means it uses light in the visible and adjacent (near UV and near –infra red) ranges. The absorption in the visible region directly affects the perceived color of the chemicals involved.

In this region of the EMR spectrum molecules undergo electronic transitions. The UV Visible spectrum of *Caralluma fimbriata* components in the Ethanolic extract is shown (Figure 1(A) shows UV analysis of control group & Figure 1(B) shows UV analysis of *Caralluma fimbriata* plant extract). The absorption peak is shown at wavelength 275 nm in control group or placebo group and its absorbance is about 0.742 A. Then in case of Caralluma group the absorbance is about 0.759 A at wavelength 275 nm. The variation in absorbance clearly shows the Caralluma group plays vital role than placebo group in maintaining the bodyweight.

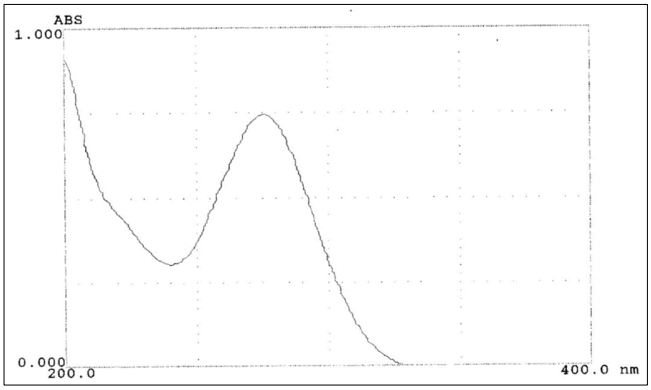

Fig 1(A): UV analysis of control group (or) placebo group

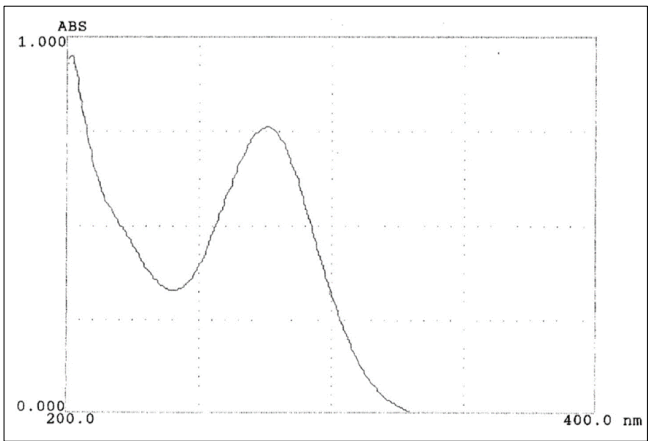

Fig 1(B): UV analysis of *Caralluma fimbriata* plant extract

FTIR analysis

The prepared plant extract of *Caralluma fimbriata* were detected by FTIR spectrophotometer. The FTIR analysis of *Caralluma fimbriata* is shown (Figure 2 showing FTIR analysis of *Caralluma fimbriata* plant extract). The prominent bands of absorbance were absorbed at around 3392.17cm^{-1} in between the range of 4000-400cm^{-1}.

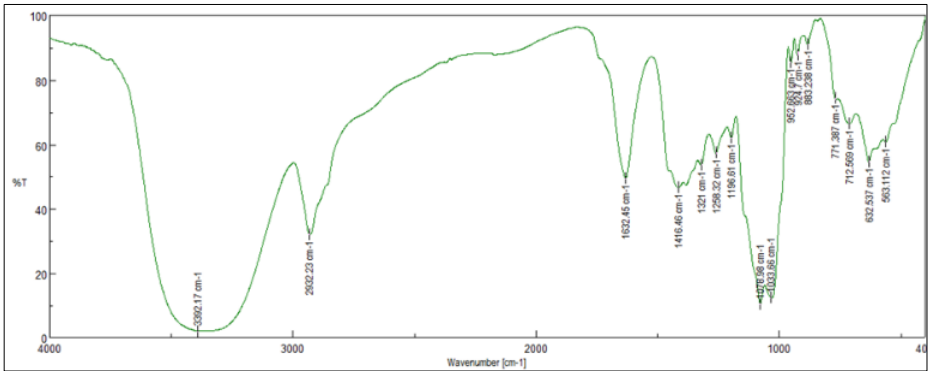

Fig 2: FTIR analysis of *Caralluma fimbriata* plant extract

GC-MS analysis

The plant extract of *Caralluma fimbriata* were analyzed by GCMS (Figure 3 showing GCMS analysis of *Caralluma fimbriata* plant extract). The compound along with their retention time (RT), molecular formula, molecular weight (MW) and peak area (%) are found it is shown in table 1. The n-Hexadecanoic acid (38.20%) and oleic acid (26.59%). (Figure 3 showing the GCMS analysis of *Caralluma fambriata*). Similarly, in earlier research studies have also observed the maximum peak area % in n-Hexadecanoic acid and oleic acid [1].

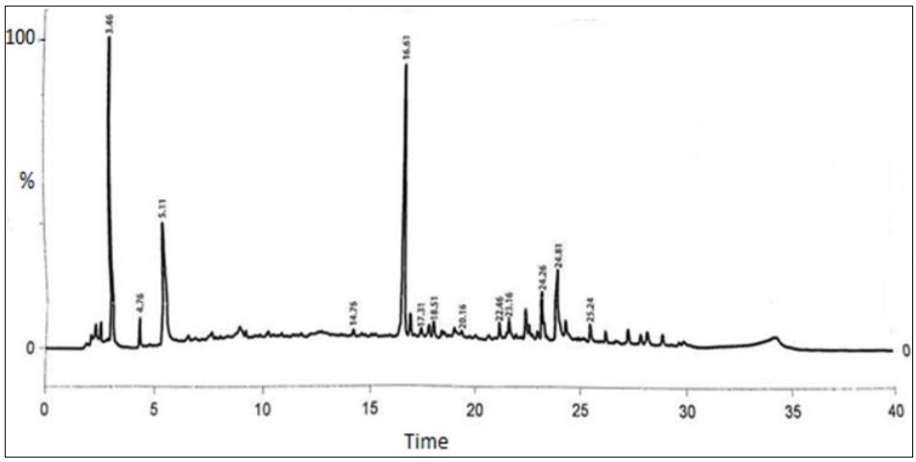

Fig 3: GC-MS analysis of *Caralluma fimbriata*

Table 1: Components in *Caralluma fimbriata* extract by GCMS

S.no	Retention time	Compound name	Molecular formula	Molecular weight	Peak area %
1	3.46	n-Hexadecanoic acid	$C_{16}H_{32}O_2$	256	38.20
2	4.76	Heneicosanoic acid, methyl ester	$C_{22}H_{44}O_2$	340	2.22
3	5.11	9, 12-Octadecadienoic acid (z, z)	$C_{18}H_{32}O_2$	280	8.05
4	14.76	Eicosanoic acid, methyl ester	$C_{21}H_{42}O_2$	326	0.26
5	16.61	Oleic acid	$C_{18}H3_{34}O_2$	282	26.59
6	17.31	Squalene	$C_{30}H_{50}$	410	0.86
7	18.51	Heptadecanoic acid	$C_{17}H_{34}O_2$	270	1.25
8	20.16	Hexadecanoic acid, methyl ester	$C_{17}H_{34}O_2$	270	2.70
9	22.46	Tetradecanoic acid	$C_{14}H_{28}O_2$	228	2.30
10	23.16	Octadecanoic acid	$C_{18}H_{36}O_2$	284	3.45
11	24.26	1, 2-Benzene dicarboxylic acid	$C_{24}H_{38}O_4$	390	5.27
12	24.81	Octadecanoic acid	$C_{18}H_{36}O_2$	284	6.35
13	25.24	9, 15-Octadecadienoic acid (z, z)	$C_{19}H_{34}O_2$	294	1.66
14	27.84	3, 7, 11, 15– Tetramethyl-2- hexadecen-1-ol	$C_{20}H_{40}O$	296	0.84

Summary and Conclusion

The plant extract were analyzed by UV-Visible spectrophotometer, Fourier transform infrared spectroscopy (FTIR) and Gas chromatography-mass spectrometry (GCMS) shows higher activity in *Caralluma fimbriata* extract. Similarly, the extract of *Caralluma fimbriata* used in treatment of various ailments. Hence, it is clear from the result presented in this study that Caralluma group, which has more antiobesity property than placebo group. *Caralluma fimbriata* are broadly involved in the treatment of Diabetes, leprosy, antiseptics and various ailments.

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