Journal of Pharmacognosy and Phytochemistry

Available online at www.phytojournal.com

J P P Journal of Pharmacognosy and Phytochemistry

E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2016; 5(2): 105-108
Received: 24-01-2016
Accepted: 26-02-2016

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Evaluation of phytoconstituents of *Caralluma nilagiriana* by FTIR and UV-VIS spectroscopic analysis

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Abstract
Spectroscopic techniques can advantageously be employed for qualitative and quantitative analysis of plant extracts. In the present work we deal with the nature of visible absorption spectra of ethanolic leaves' extract of *Caralluma nilagiriana* medicinal plant. *Caralluma nilagiriana* is a plant known to be rich in phytoconstituents that are regarded as compounds possessing beneficial biological activities and, in view of this phenomena, an attempt at identifying such phytoconstituents present in *C. nilagiriana* was undertaken. FTIR analysis and UV-VIS analysis showed the presence of phenolic compound and flavonoids; while the peaks at 227.6nm, 401.6nm and 664.6nm of the UV-VIS profile corresponded to those of the Flavonoid, Terpenoids, and Chlorophylls' respectively, the ones of the FTIR spectra had amply evidenced the occurrence of OH group together with the Terpeniols, Phenol& Alcohol, Carboxylic Acids, Nitro Groups, Esters and Ethers.

Keywords: Phytoconstituents, Functional group, *Caralluma nilagiriana*, FTIR, UV-VIS

1. Introduction
Phytochemical characterization of plant material is important as it relates to the nature and extent of therapeutic action possible with its use. Among the thousands of naturally occurring constituents so far identified in plants and exhibiting a long history of safe use, there are none that pose- or reasonably might be expected to pose- a significant risk to human health at current low levels of intake when used as flavoring substance [2]. However, due to their natural origin, environmental and genetic factors are bound to influence the chemical composition of plant essential oils; factors such as species and subspecies, geographical location, harvest time, plant part used and method of isolation are all certain to affect chemical composition of the crude material separated from the plant. Against this background, screening of plant extracts for their antioxidative and antimicrobial ability has assumed a great significance [3].

Though a variety of techniques can be used to determine and estimate the presence in medicinal plants of bioactive substances such as for example, alkaloids, terpenoids, flavonoids, steroids, tannins, phenolic compounds and other that provide definite physiological action on the human body, Chromatography and spectroscopic techniques, undoubtedly, are among the most useful and popular tools used for this purpose. While Fourier Transform Infrared (FTIR) spectroscopy has come to be established as the time-saving method to characterize and identify functional groups (Grube *et al*., 2008) allowing analysis of a relevant amount of compositional and structural information in plants, Ultraviolet-visible spectrophotometry (UV-Vis) supplements the efforts as, thankfully, many organic and inorganic compounds, on their own, have strong absorption bands in the UV/Vis region of the electromagnetic spectrum and even in those instances where an analyte does not absorb UV/Vis radiation - or if its absorbance is too weak - often one can react it with another species that is strongly absorbing so that the Beer-Lambert law can be obeyed & the analyte's concentration can be evaluated [8-10].

In India, *Caralluma* species have been an edible delicacy and on account of their being antipyretic, anthelmintic and analgesic, have, for long, found a place in traditional medicine for the treatment of rheumatism, diabetes, leprosy, tumor, fungal diseases, snake and scorpion bites. Regrettably, the whole of the said species, in general, and *C. nilagiriana*, a noted member of this family, in particular, have got depleted as of the present time because of over exploitation and lack of organized cultivation and in effect, have now become restricted to Nilgiris, Tamilnadu alone [4]. The biological activities and phytochemical constituents of this precious resource belonging to the plant kingdom have remained undocumented so long and in order to correct the situation, the present research work has been taken up to produce the UV-VIS and FTIR spectrum profile of *C. nilagiriana.*

2. Materials and Methods

2.1 Plant material and Collection

The individuals of *Caralluma nilagiriana* were collected from foot hills of The Nilgiris, Tamilnadu and their binomial authenticity was confirmed with the voucher specimen deposited in the Department of Botany, Government Arts College (Autonomous) Coimbatore [1].

2.2 Preparation of extractions

Fresh plants were dried at room temperature for two weeks following which they were powdered with a hand mill [5]. About 1 g of the powdered material was then subjected to extractions using Soxhlet apparatus in AR grade Methanol for a duration extending up to 6 hours [6]. The extracts were finally filtered and subsequently concentrated in rotary evaporator under reduced pressure (Vacuum 175 mbar for bp at 40 ºC) to result in thick green crude extracts [7].

2.3 Spectroscopic analysis by UV-VIS

The extracts obtained as above were scanned in the wavelength range of 190-900nm using GBC UV/VIS 918 model UV spectrophotometer and the characteristic peaks were detected; the values of the peaks were recorded too.

2.4 Spectroscopic analysis by FT-IR

The FTIR spectra, generated by a sophisticated, computer controlled FTIR, were recorded in Thermo scientific spectrometer SMART iTR basic in NICOLET iS10 model. Using with ZnSe (zinc selenium) semiconductor the extracted plant samples of *Caralluma nilagiriana* were scanned at room temperature within a spectral range of 4000-400 cm-1. In the present work it is possible to directly relate the intensities of absorption bands to the concentration of the corresponding functional groups.

3. Result

3.1 Functional groups identification

The FTIR spectrum was used to identify functional groups of the active components present in plant samples based on the peaks values in the region of IR radiation. In the current investigation involving *Caralluma nilagiriana*, the results of FTIR analysis had confirmed the presence of alcohol, phenol, Terpene group of compound (fig-1, 2 and table-1).

3.2 Quantitative spectrophotometric analysis

The UV-VIS profile of plant extract was studied over the 190 to 900nm wavelength due to the sharpness of the peaks and proper baseline. The profile showed the peaks at 227.6nm, 401.6nmand 664.6with the absorption 4.4032, 1.9870 and 0.3081 respectively (fig-3, and table-2).

4. Discussion and Conclusion

Spectroscopic technique has become a powerful analytical tool for the qualitative and quantitative analysis of pharmaceutical and biological materials. An IR spectrum of *Caralluma nilagiriana* plant extract shows the presence of OH group, Phenol & Alcohol, Carboxylic Acids, Nitro Groups, Esters and Ethers group of compounds, while its UV-VIS spectrum has absorption bands at 227.6, 401.6 and 664.6 nm those which are characteristic of flavonoids and its derivatives. The Flavonoids and Terpinoids spectra typically consist of first two absorption maxima, the first in the range 230-290 nm (band I) and the second in the range 400-550 nm (band II). The chlorophyll spectra typically consist of two absorption maxima in the range 600-700 nm (band III). The precise position and relative intensities of these maxima give valuable information on the nature of the flavonoids [11, 12].

Further research aimed at performing the structural analysis of flavonoid compounds by use of different analytical methods such as NMR and Mass spectrophotometer will be needed so that this further screening will usher in a better understanding of their biological activities towards them being considered a contender for therapeutic uses.

5. Acknowledgement

The authors are grateful to the management of SITRA for providing the necessary institutional amenities and also express his sincere thanks to Dr. Prakash Vasudevan, Director (SITRA), and Coimbatore for the kind encouragement and technical support rendered by him during this work.

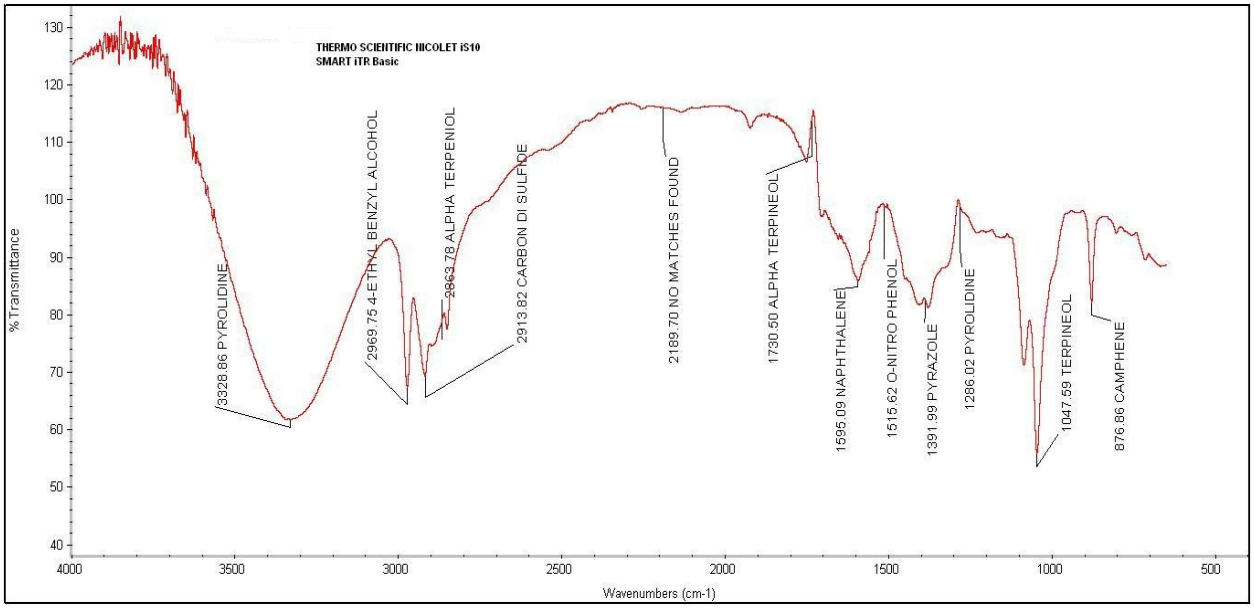

Fig 1: FTIR spectrum of Ethanolic extract of *Caralluma nilagiriana*

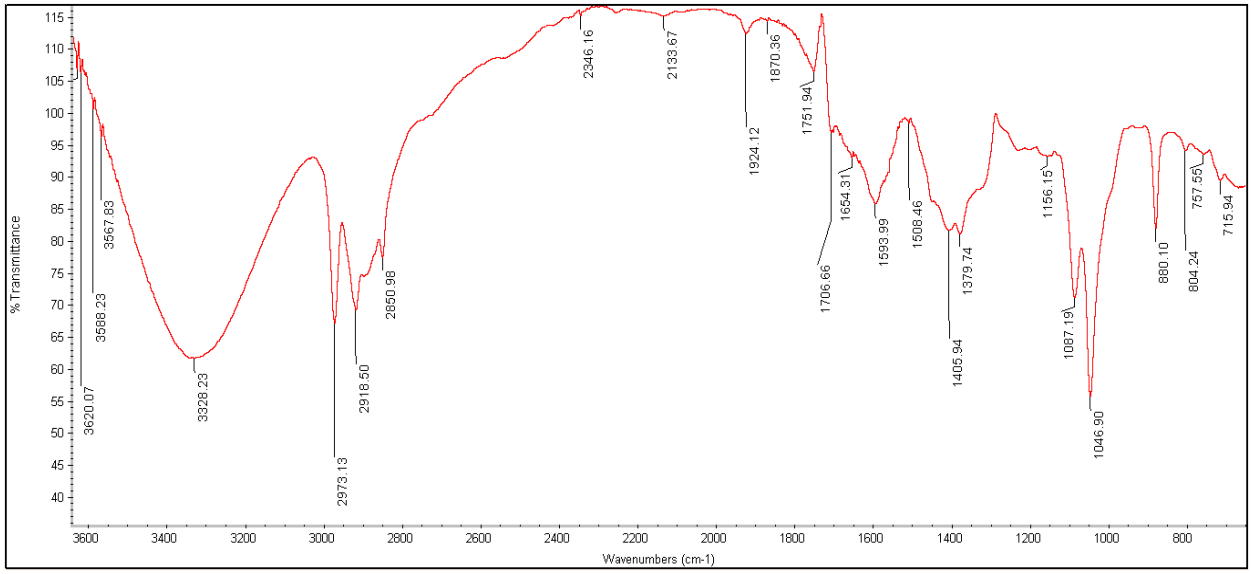

Fig 2: FTIR Intensity range spectrum of Ethanolic extract of *Caralluma nilagiriana*

Table 1: FT-IR Compound Name and Hit list of *Caralluma nilagiriana* Ethanolic extract

Index	Match	Compound Name
55	52.97	(R,R)-(+)-P-Menth-1-En-9-Ol, 97%
60	51.34	2-Fluoroethanol, 95%
6	50.68	2-Methyl-1-Pentanol, 95%
58	39.63	Terpinen-4-Ol, 95%
57	38.84	Alpha-Terpineol, 98%
68	38.80	Benzenesulfinic Acid, Sodium Salt, 97%
38	37.54	2,3-Butanediol
13	35.79	1,3-Butanediol
31	35.67	Trans-4-Octene, 99%
74	35.52	Heptane, 99%
7	35.06	(+)-Beta-D-Lactose
23	34.65	2,4-Dimethyl-3-Pentanol, 99%
28	34.17	Dicyclopentadiene, 95%
6	33.26	D-(-)-Fructose, 98%
56	32.85	(1r,2s,5r)-(-)-Menthol
78	31.41	3-Ethyltoluene, 99%
100	31.02	3c2sulfate Nonahydrate, 99.999%
15	30.89	1,4-Butanediol
4	30.40	Tert-Butylbenzene, 99%
52	29.06	(-)-Camphene, 95%
7	27.32	Trans-2-Hexene, 99+%, Gold Label
51	26.42	(R)-(+)-Limonene, 97%
4	25.96	1,3-Dichlorobutane, 99%
92	25.87	4-Ethylbenzyl Alcohol, 99%

Spectrum: Caralluma Ethanolic Extract
Region: 3995.85-455.13
Hit List:

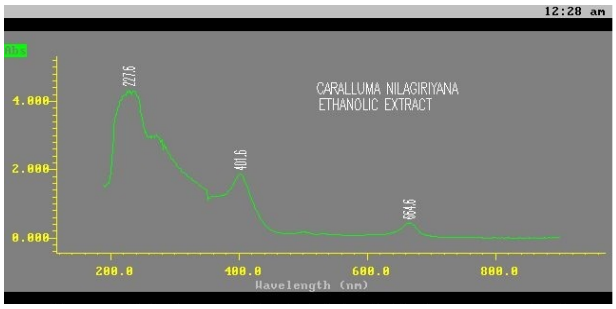

Fig 3: UV-VIS spectrum of Ethanolic extract of *Caralluma nilagiriana*

Table 2: UV-VIS Peak Values of Extracts of C*aralluma nilagiriana* Ethanolic extract

S.NO	Wavelength (nm)	Absorption
1	227.6(Flavonoids)	4.4032
2	401.6(Terpenoids)	1.9870
3	664.6(chlorophyll)	0.3081

6. References

1. Prabakaran R, Kalimuthu K. Antibacterial Activity of the whole plant of *Caralluma nilagiriana* kumari & Subbarao-an endemic medicinal plant. Int J Pharm Bio Sci. 2013; 4(1), (B):42-48.
2. Akerale. Global Importance of Medicinal Plants, Conservation of Medicinal Plants, 1991.
3. Botanical Survey of India, studied on rare and endangered species, 2002, ttp://.envfor.nic.in/bsi/reseaach.html.(2002)
4. Kumari. A new species of caralluma (Asclepiadaceae) from India. J of Botony Natural history Society. 1976; 86:480.
5. Harbourne JB, Phytochemical Methods. A Guide to Modern Techniques of Plant Analysis Chapman and Hall London, 1984.
6. Chandrasekar R, Rao SN. Phytochemical Analysis of ethanolic extract of Leaves of Leucas indica (EELLI). Int. J Pharm bio sci. 2013; 4(1):33-38.
7. Prashant Tiwari. Phytochemical Screening and extraction review int. pharmaceutical science, 2011, 1.
8. Moses AG, Maobe Robert M. Nyarango Fourier Transformer Infra-Red Spectrophotometer Analysis of *Warburgia ugandensis* Medicinal Herb Used for the Treatment of Diabetes, Malaria and Pneumonia in Kisii Region, Southwest Kenya Global Journal of Pharmacology. 2013; 7(1):61-68,
9. Lethika D Nair, Santosh K Sar. ABSTRACT Arun Arora, Deepak Mahapatra, Fourier Transform Infrared Spectroscopy Analysis of Few Medicinal Plants of Chhattisgarh, India Journal of Advanced Pharmacy Education & Research. 2013; 3(3):196-200.
10. Mitali Konwar, Baruah GD. On the nature of vibrational bands in the FTIR spectra of medicinal Scholars Research

Library Archives of Applied Science Research. 2011; 3(1):214-221.
11. Mamta Saxena, Jyoti Saxena. Evaluation of phytoconstituents of *acorus calamus* by FTIR and UV-VIS spectroscopic analysis International Journal of Biological & Pharmaceutical Research. 2012; 3(3):498-501.
12. Neha Sahu, Jyoti Saxena. Phytochemical Analysis of *Bougainvillea Glabra Choisy* by FTIR and UV-VIS Spectroscopic Analysis Int. J Pharm Sci Rev Res. n° 33 2013; 21(1):196-198.