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RESEARCH ARTICLE

Phytochemical Analysis of *Curcuma Amada* by FTIR and UV-VIS Spectroscopic Analysis

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ABSTRACT

The present study was aimed to produce the UV-VIS and FTIR spectrum profile of *Curcuma amada*. The extracts were examined under visible and UV light for the proximate analysis. The crude extracts of *Curcuma amada* were scanned in the wavelength ranging from 200-800 nm by using Perkin Elmer Spectrophotometer and the characteristic peaks were detected. FTIR method was performed on a Perkin Elmer Spectrophotometer system, which was used to detect the characteristic peak values and their functional groups. The UV-VIS profile *of Curcuma amada* methanolic extract showed the peaks at 268 nm absorption 0.395. The FTIR spectrum was used to identify the functional group of the bioactive components based on different peak values in the region of infrared radiation. The results of the present study confirm the presence of carboxylic acids, alcohols, carbonyl and benzene ring, in *Curcuma amada*. The results of the present study produced the UV-VIS and FTIR spectrum profile for the medicinally important plant *Curcuma amada* also used to identify the plant in the pharmaceutical industry.

KEYWORDS

Curcuma Amada, UV-VIS, FTIR

INTRODUCTION

The world of flora is vast and immense but unfortunately known species of plant are getting endangered day by day, due to improper collection and excessive usage of particular known species in clinical practice, so it is necessary for us to evaluate and explore the hidden therapeutic use of medicinal plant[1]. One of such is "Amargandha Haridra" (*Curcuma amada*) Ayurveda and Unani medicinal systems have given it much importance as an appetizer, alexteric, antipyretic, aphrodisiac, diuretic, emollient, expectorant and laxative to cure biliousness, itching, skin diseases, bronchitis, asthma, hiccough and inflammation due to injuries[2]. The presence of polyphenols, terpenoids, alkaloids, flavonoids and other secondary metabolites in plants will provide a scientific validation for their popular use. Therefore, the analysis of these constituents would help in determining various biological activities of plants and provide us unlimited opportunities for development of new drug[3].

A variety of techniques can be used to determine and estimate the presences of such phytoconsitutents in medicinal plants. Spectroscopic (UV-Vis, FTIR) methods together or separate can be used because of its simplicity, cost-effective and rapid tests for detecting phytocomponents[4-6]. The Fourier Transform

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Infrared (FTIR) spectroscopy allows the analysis of a relevant amount of compositional and structural information in plants[7].Ultraviolet-visible spectrophotometry (UV-Vis) related to the spectroscopy of photons in the UV-visible region. UV-visible spectroscopy uses light in the visible ranges or its adjacent ranges. The color of the chemicals involved is directly affects the absorption in the visible ranges. Molecules undergo electronic transitions in these ranges of the electromagnetic spectrum[8].

The genus Curcuma, a member of the Zingiberaceae family, comprises of 80 species[9]. They occur in wild and cultivated forms and are widely distributed throughout the tropics of Asia, Africa and Australia. Curcuma amada. **(mango ginger**) commonly known as Aamba Haldi. Grown in West. Bengal and on the hills of West Coast of India. It has Rhizome buff coloured with short and smooth fracture[10]. The plant is a rhizomatous herb with palmate and sessile tubers united to the sides of an ovate conic bud which gives rise to the leaves and spikes. The name of the species came from the peculiar smell of the rhizome, that of unripe mango. It grows well in fertile soil with free drainage[11]. It is used in the manufacture of pickles, culinary preparations, and salads as a source of raw mango flavour and high medicinal properties[12]. With this knowledge, the present research work was aimed to produce the UV-VIS and FTIR spectrum profile of *Curcuma amada* rhizome extract.

MATERIAL AND METHODS

Collection of Plant Material

The rhizomes of Curcuma were collected from were collected from ruler area of Bhopal (M.P), India in the months of May 2010. These herbs were authenticated by Dr. Khan, Department of Botany, Safia College Bhopal and preserved in the herbarium of the institute.

Preparation of Extract

The rhizomes were cut into pieces and shed dried. The dried rhizomes were coarsely powdered and successfully extracted with methanol using Soxhlet extractor at a temperature of 55-60 ^{0}C for a period of 7-8 hrs. The solvents was distilled off at lower temperature under reduced pressure and concentrated to dryness (crude extract). The dried extract was weighed and then stored in a freezer.

UV-VIS and FTIR Spectroscopic Analysis

The extracts were examined under visible and UV light for proximate analysis. For UV-VIS and FTIR spectrophotometer analysis, the extracts were centrifuged at 3000 rpm for 10 min and filtered through Whatmann No. 1filter paper. The extracts were scanned in the wavelength ranging from 200-800nm using Perkin Elmer Spectrophotometer and the characteristic peaks were detected. FTIR analysis was performed using Perkin Elmer Spectrophotometer system, which was used to detect the characteristic peaks and their functional groups. The peak values of the UV-VIS and FTIR were recorded. Each and every analysis was repeated twice for the spectrum confirmation.

RESULTS AND DISCUSSION

Quantitative Spectrophotometric Analysis

The UV-VIS profile of rhizome extract was taken at the 200 to 800nm wavelength due to the sharpness of the peaks and proper baseline. The UV-VIS profile of *Curcuma amada methanolic* extract showed the peaks at 268 nm and absorption of 0.395. (Figure 1, and Table 1).

Table 1: UV-VIS Peak Values of Extracts of *Curcuma amada* rhizome

S.NO.	Wavelength(nm)	Absorption
1.	268.00	0.395

Functional Groups Identification

The FTIR spectrum was used to identify the functional groups of the bioactive components present in plant based on the different peaks values in the region of IR radiation. When the rhizome extract was passed into the FTIR, the functional groups of the components were separated based on its peaks values. The broad peak 3259.95 due to inter molecular hydrogen bonding of OH, 3015.23 Aromatic C-H Stretching, 1704.91 C=O stretching of Carbonyl

group, 1651.08, 1503.42, 1417.91 Characteristics ring vibrations, 1171.34, 1072.6 C-O stretching. The results of FTIR analysis confirmed the presence of the presence of carboxylic acids, benzene ring, carbonyl and phenol in Curcuma amada (Figure 2, and table 2).

Table 2: FTIR Peak Values of Extracts of Curcuma amada rhizome

S. No.	Frequency(cm^{-1})	Inference
1.	3259.95	OH str.
2.	3015.23	Aromatic CH str.
3.	1704.91	C=O str.
4.	1171.34, 1072.6	C-O str.
5.	1651.08,1503.42, 1417.91	Carbonyl group

Hence, the crude extracts subjected to UV-VIS and FTIR analysis is used for the identification of chemical constituents present in Curcuma amada. In addition, UV-VIS and FTIR spectroscopy is proved to be a reliable and sensitive method for detection of bio molecular composition.

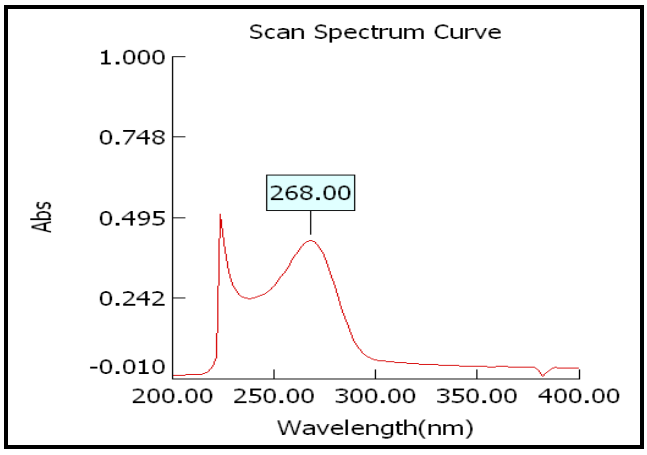

Figure 1: UV-Vis Spectrum of Extract of Curcuma amada rhizome

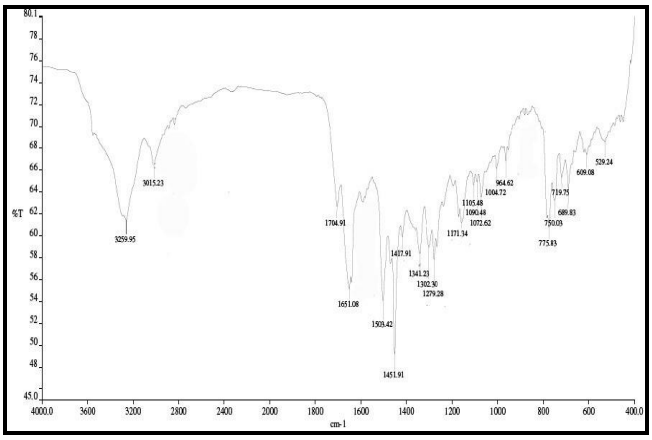

Figure 2: FTIR Spectrum of Extract of Curcuma amada rhizome

CONCLUSION

FTIR and UV- Vis have become a powerful tool for secondary metabolite profiling as well as for qualitative and quantitative analysis of the pharmaceutical materials. In previous researches show the main constituents of *Curcuma amada* are ocimene, dihydro-ocimene, α-pinene, α-curcumene, β-curcumene, linalool, cuminyl alcohol, keto-alcohol, camphor, turmerone, linalyl acetate, safrole, curcumin, myristic acid, car-3-ene, myrcene, 1,8-cineol, limonene and perillene[13]. Besides three terpenoid bioactive compounds, viz. difurocumenonol, amadannulen and amadaldehyde were successfully isolated and characterized from chloroform extract of *Curcuma amada* rhizome[14].

Analysis of the methanolic extract of curcuma amada rhizome under FTIR and UV-VIS spectroscopic technique showed that the presence gallic acid and derivatives. Which can be isolated and further screened for different kind of biological activities depending their therapeutic uses. Further research will be needed for the structure characterization of isolated compound by use of different analytical methods such as NMR and Mass spectrophotometer.

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