



Preliminary Phytochemical Analysis and Spectroscopic Analysis of Methanolic Extract of *Asteracantha Longifolia* (Nees.)

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

The present investigation was focused on the preliminary phytochemical, UV-VIS spectrum and Fourier Transform Infrared Spectral analysis of *Asteracantha longifolia*. The Methanolic extract from the leaves of *Asteracantha longifolia* were tested for the availability of alkaloids, flavonoids, tannins, saponins, proteins, Terpenoids, Phenols, Steroids, Glycosides and Carbohydrates. The UV-VIS profile demonstrated various peaks ranging from 400-700 nm with various Extract respectively. The FT-IR spectrum confirmed the presence of secondary alcohols, alkanes, alkynes, aromatics, alkenes, sulphur, phosphorus, esters, hydrocarbons, nitrogen compounds (amines) in methanolic extract. The results of this study offer a platform of using *Asteracantha longifolia* leaves as herbal alternative for various diseases including diabetic, cardiovascular etc. The results of this study offer a platform of using *Asteracantha longifolia* leaves as herbal alternative for various diseases including cancer and diabetic.

Keywords: *Asteracantha longifolia*; amine; aldehydes; alkanes UV-VIS and FTIR.

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1. INTRODUCTION

The connection between human wellbeing and plants exist from fossils history around 60,000 years prior. Around 215,000 to 500,000 types of higher plants remain alive on earth. Yet, just 6% of plants are being utilized for the organic action. Right around 122 mixtures have been extricated from 94 types of plants and 80% of these mixtures have been utilized for a similar aim or related reason [1-2]. Nature has given the tremendous variety of restorative plants and strong bioactive constituents for mankind as long numerous years; anyway plants are the fortunes for the wellspring of prescriptions for the essential medical services framework [3].

The distinctive phyto-chemicals present in restorative plants are flavonoid, alkaloid, phenol and tannins, carboxylic acids, terpenes and amino acids and inorganic acids. These phyto-constituents give explicit peculiarity and properties to plants. An assortment of methods can be utilized to decide and appraise the existences of such phyto-constituents in restorative plants. Chromatography and spectroscopic methods are the most helpful and well known devices utilized for this reason. The Fourier Transform Infrared Spectrophotometer (FT-IR) was maybe the most useful asset for distinguishing the kinds of substance bonds/utilitarian gatherings present in the phytochemicals. Additionally, FTIR spectroscopy is a set up time saving technique to describe and distinguished practical gatherings. UV-VIS spectroscopic is straightforward practical and quick tests for distinguishing phytocomponents. UV- spectroscopy utilizes light in the noticeable reaches or its adjoining ranges. The shade of the synthetics included is straightforwardly influences the assimilation in the noticeable reaches. Atoms go through electronic advances in these scopes of the electromagnetic spectrum [4]. Plants are profoundly used and incredible consideration in the clinical framework because of the presence of an enormous number of auxiliary metabolic compounds found in plants [5].

Asteracantha longifolia is an important medicinal plant with wide range of biological activities and interesting phytochemical constituents. *Asteracantha longifolia* Nees (Family-Acanthaceae) is developing as a supernatural occurrence herb with a verifiable foundation since numerous scientists uncovered its wide range of pharmacological potential. *Asteracantha longifolia* Nees [Syn. *Hygrophila auriculata*

(Schum) Heine Acanthaceae] is a therapeutic plant which is utilized as a part of a few ailments. It is a broadly herb regularly found in moist places of banks of tanks, ditches and paddy fields all through India, Sri-Lanka, Burma, Malaysia, and Nepal. The plants are depicted in the ayurvedic writing as Ikshura, Ikshagantha and Kokilasha having eyes like the Kokila or the Indian Cuckoo. It is arranged in the ayurvedic arrangement of pharmaceutical as Seethaveryam, Mathuravipaka and is utilized for the treatment of various conditions including Premeham (Diabetes) and Athisaram (Dysentry) [6]. Phytochemical investigations of plant parts different extracts presence of Flavonoids, Alkaloids, Triterpenes and Sterols et al. [7]. Pharmacological investigations have revealed its Against tumor action [8], Anti-microbial activity and Free radical scavenging activity [9], antidiabetic activity [10] Anthelmintic activity [11], Hepatoprotective activity [12].

1.1 Reason for Selection of *Asteracantha longifolia*

- *Asteracantha longifolia* is easily available in tamilnadu state.
- And traditionally used many medicinal purposes.
- Previously, no reports regarding FT-IR and uv-spectra analysis on this plant. That's why we can choose this plant.

The advances in scientific analytical techniques, including Preliminary phytochemical analysis, Uv-Vis and FT-IR that were powerful tools for identification and determination of phytochemicals compounds. The present study was carried out the bioactive molecules present in the *Asteracantha longifolia* in methanol extract with the aid of Preliminary phytochemical, Uv-Vis and FT-IR techniques, which may give knowledge in its utilization of conventional drug.

2. MATERIALS AND METHODS

2.1 Collection and Processing of Plant Material

The leaves of the plant *Asteracantha longifolia* were collected from the natural habitats of Annamalai Nagar, Cuddalore district, Tamil Nadu, India. The plant was taxonomically identified by Dr. D. Kumarasamy, Associate professor, Department of Botany, Annamalai University, following method on Bowles [13]. The

plant herbarium account number 2138 (Department of Botany- DDE, herbarium centre). The samples were washed with sterile distilled water. The leaves were cut, shade dried, ground into fine powder and stored in air tight polythene bags until use.

2.2 Plant Sample Extraction

The collected leaves was shade dried, powered and 2 g of air dried powder of leaf sample was extracted with 50 ml of solvents such as N-hexane, Petroleum ether, Ethyl acetate, Methanol using Soxhlet apparatus for 8 hours. The extracts were filtered and filtrates were concentrated under reduced pressure at 40° C using a rotary flash evaporator and it was then transferred to glass vials and kept at 4°C before use.

2.3 Preliminary Phytochemicals Screening

Phyto-Chemical tests were carried out on the methanolic extract using standard procedures to identify the preliminary phytochemical screening following the methodology of Harborne [14].

2.4 UV-VIS Spectroscopic Analysis

The various solvent extracts were analyzed under visible and UV light for proximate examination. For UV-VIS spectrophotometer investigation, the extracts were centrifuged at 3000 rpm for 10 min and filtered through Whatmann No. 1 filter paper by using high pressure vacuum pump. The sample is diluted to 1:10 with the same solvent. The extracts were checked in the wavelength going from 200-900 nm utilizing Perkin Elmer Spectrophotometer and the trademark peaks were recognized. The peak values of the UV-VIS were recorded. Every single investigation was repeated twice for the spectrum affirmation [15].

2.5 FT-IR Spectroscopic Analysis

FT-IR Study we can use only methanolic extract. Fourier transform infrared spectrophotometer (FTIR) is perhaps the most powerful tools for identifying the types of chemical bonds (functional groups) present in compounds. Oven-dried leaves samples (60°C) were ground into fine powder, using a mortar and pestle. Two milligrams of the sample was mixed with 100 mg KBr (FT-IR grade) and then compressed to

prepare a salt-disc (3 mm diameter). The disc was immediately kept in the sample holder and FT-IR spectra were recorded in the absorption range between 400 and 4000 cm⁻¹. All investigations were carried out with a Shimadzu FT-IR spectrometer [16].

3. RESULTS AND DISCUSSION

Nature is consistently a brilliant sign to show the unmistakable wonders of conjunction. Characteristic items from plants, creatures and minerals are the reason for treating human illnesses. Therapeutic plants are by and by sought after, and their acknowledgment is expanding dynamically [17]. The plant creates a wide assortment of phytochemical constituents, which are auxiliary metabolites and are utilized either straightforwardly or in a roundabout way in the drug business [18]. Today there is developing interest in compound piece of plant based prescriptions. A few bioactive constituents have been disconnected and read for pharmacological movement [19]. Phytochemical act as a natural defense system for lost plants and provide color, aroma and flavor, they have great potential in treating human disease such as cancer, coronary heart disease, diabetics and infectious diseases [20].

The data acquired from the preliminary phytochemical screening will uncover the valuable discoveries about the compound idea of the remedy [21]. The successive methanolic leaves extract of *Asteracantha longifolia* have revealed the presence of alkaloids, flavonoids, tannins, saponins, proteins, Terpenoids, Phenols, Steroids, Glycosides and Carbohydrates (Table 1; Fig. 1). In this manner, the preliminary screening tests might be helpful in the identification of bioactive principle and may prompt to the drug discovery and improvement. Phytochemicals, for example, alkaloids, terpenoid, steroids, saponins were processed the standard techniques, phytochemical investigation of plant washave to find and reached out to novel remedially specialists with improved effectiveness.

Phytoconstituents like saponins, phenolic mixtures and glycosides have been accounted for to restrain bacterial development and to be defensive of plants against bacterial diseases [22]. Fragrant plants with rich phenolic compounds has great medicinal qualities which assists with treating different illnesses [23]. The medicinal employments of alkaloids found in the

plant leaves have been known for quite a long time, and among them, cytotoxicity is one of their biological properties [24].

Auxiliary metabolites significant for human existence are combined by plants [25]. Phytochemicals in greenery nourishment had extraordinary arrangements of fascination. Predominantly on their job in forestalling sicknesses caused and the aftereffect of oxidative stress, and discharge reactive oxygen species has single oxygen of different radicals as a harming reaction of vigorous metabolism. The nitty gritty data of phytochemicals in different solvent are utilized to the process of are appeared in the above notice tables. This paper for the most part uncovered to the phytochemical as secondary metabolite and they can be utilized to the pharmaceutical industry for producing an efficient medication. This investigation showing consequence of the above therapeutic plant gives a premise of utilization in conventional prescription, and furthermore contain some bioactivity of phytochemical constituents was progressively important. Qualitative examination of phytochemical was all the more fascinating territory and furthermore significant use of biomedical in pharmaceutical businesses. This phytochemical investigation was extremely helpful discovering substance compound in the

plant material that lead to their quantitative estimation and finding the drug store field [26].

Table 1. Preliminary phytochemical analysis of *Asteracantha longifolia*

S.No	Phytoconstituents	Results
1.	Terpenoids	+
2.	Alkaloids	+
3.	Flavonoids	+
4.	Phenols	+
5.	Steroids	+
6.	Glycosides	+
7.	Saponins	+
8.	Tannins	+
9.	Carbohydrates	+
10.	Proteins	+

-: Absence, +: Presence, *Asteracantha longifolia*

Plants are significant wellspring of possibly valuable bioactive standards for the improvement of new chemotherapeutic specialists. The biological and pharmacological properties of numerous plants are as yet obscure. World over, the researchers are investigating the capability of using pharmacologically active compounds from therapeutic plants. Herbal medicines are utilized by 80% of the individuals worldwide because of its high effectiveness, cheap expense, non-opiate nature and less bad reactions [27].

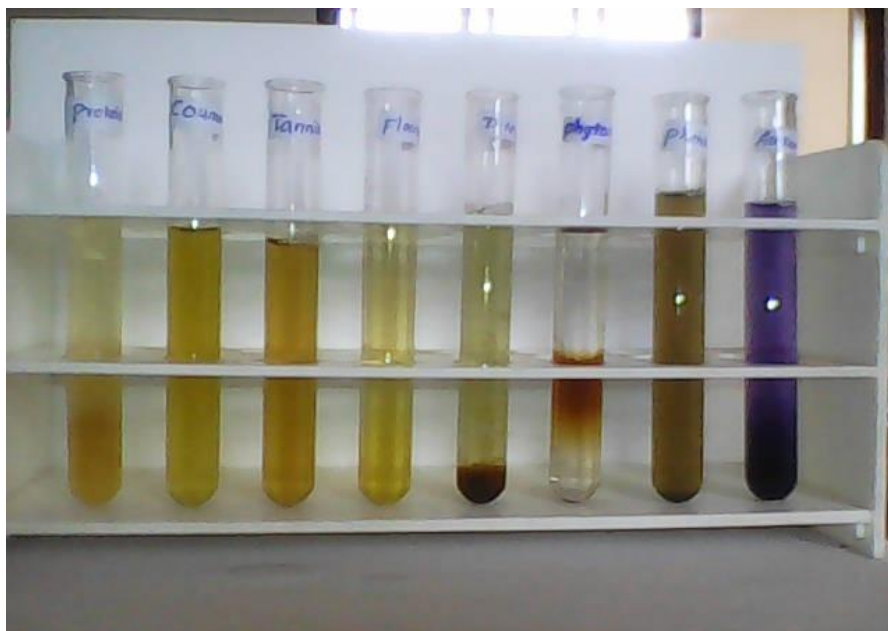


Fig. 1. Phytochemical analysis of methanolic extract of *Asteracantha longifolia* leaves

The subject of phytochemistry or plant science has gone through critical improvement as of late as particular control is worried about huge assortment of substances [28]. The qualitative UV-Vis spectrum profile of *Asteracantha longifolia*, N-hexane fraction was selected from 200-900 nm duo to sharpness of peaks and proper baseline. The profile showed the peaks at 200-400 nm and the profile showed the peaks

238nm with absorption 3.88 respectively. The Petroleum ether fraction was taken at the wavelength 226nm and absorption value 0.82. Ethyl acetate fraction shows the four peaks 502, 532, 606,658 absorption value 2.87, 2.52, 2.12, 3.94 respectively. The methanolic fraction shows 536,654 and absorption value 1.27, 3.44 respectively. The results of UV-Vis spectrum peak values were represented in Table 2 Fig. 2.

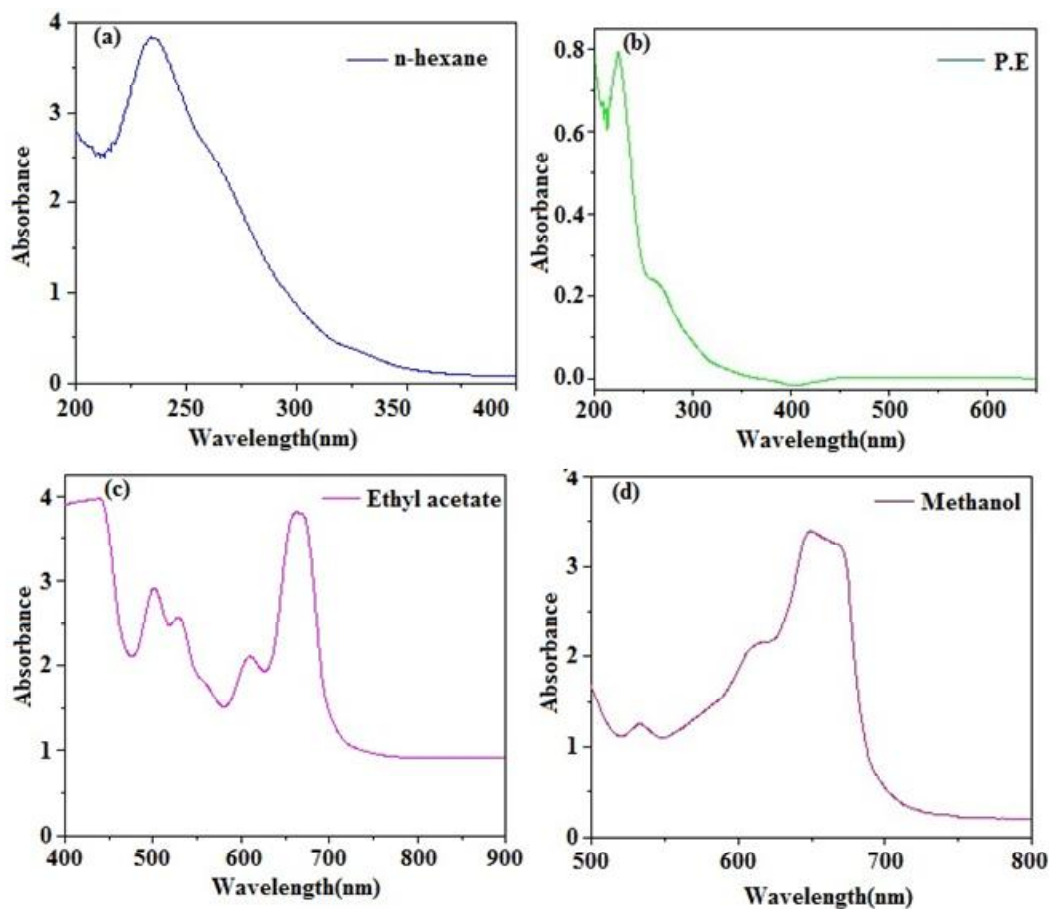


Fig. 2. *Asteracantha longifolia* various solvent extracts Uv- spectrum profile

Table 2. UV-VIS peak values of different extracts of *Asteracantha longifolia*

S.NO	Extract	Wavelength (nm)	Absorbance
1.	N-Hexane	238	3.88
2.	Petroleum ether	226	0.82
3.	Ethyl acetate	502	2.87
		532	2.52
		606	2.12
		658	3.94
4.	Methanol	536	1.27
		654	3.44

The FT-IR spectrum examination was used to identify the functional group of the active components based on the peak value in the region of infrared radiation [29]. The results of FTIR peak values and functional groups were represented in Table 3 Fig. 3. Performing the next advanced phytochemical analysis technique of FT-IR the presence of various functional groups of different compounds was found. The solvent had its respective functional group like Alcohols,

Alkanes, Alkynes, Aromatic compounds, Alkenes, Sulfate, Sulfone, Phosphoramidate, Esters, Amines etc. FT-IR spectroscopy is proved to be a reliable and sensitive method for detection of bio molecular composition. These phytochemicals are responsible for various pharmacological actions like antimicrobial and anti-oxidant anti-inflammation activities etc. *Asteracantha longifolia* has medicinal value the presence of these major constituents.

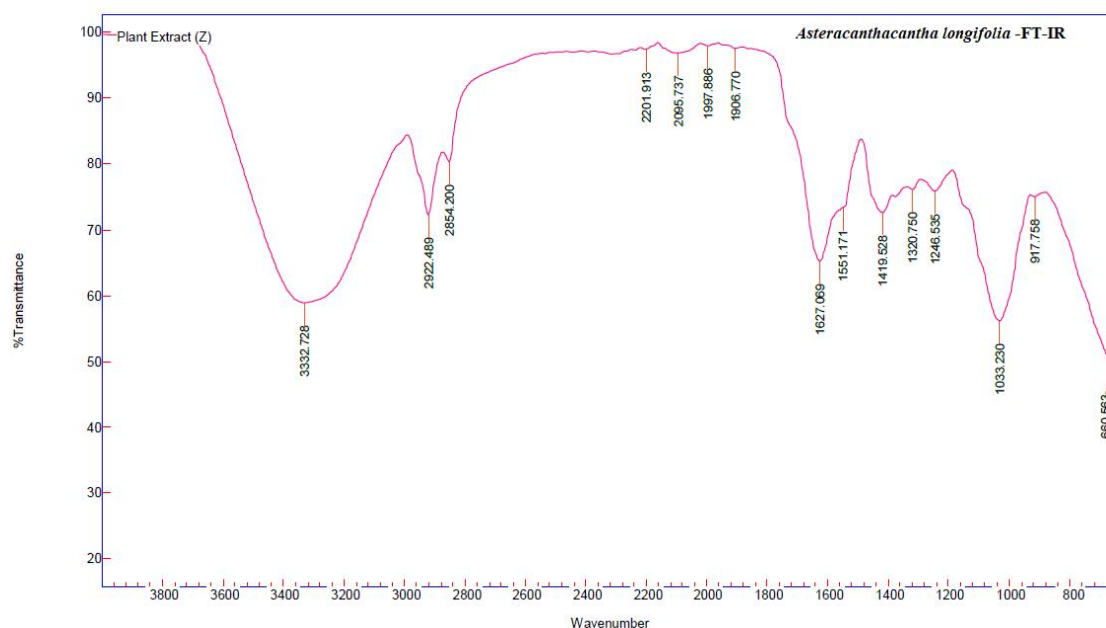


Fig. 3. FT-IR of the phytoconstituents of *Asteracantha longifolia*

Table 3. FT-IR peak values of methanolic extract of *Asteracantha longifolia*

S.No	Peak Values	Functional Groups
1	3332.728	O-H
2	2922.489	C-H
3	2854.200	C-H
4	2201.913	C-C
5	2095.737	Unknown functional Group
6	1997.886	Aromatic compounds. Aromatic overtones of ring bends
7	1906.770	Aromatic compounds. Aromatic overtones of ring bends
8	1627.069	C=C
9	1551.171	N-H
10	1419.528	S=O
11	1320.750	S=O
12	1246.535	P=O
13	1033.230	C-O
14	917.758	C-C
15	660.563	NH ₂ (or) N-H

4. CONCLUSION

The results of the present study was concluded that traditional use of *Asteracantha longifolia* for the human ailments and its partly explained its use in herbal medicine. Thus this plant can be utilized as an alternative source of useful drugs. The presence of different characteristic functional groups, phytochemicals are identified, these are responsible for different kind of biological activities depending their pharmaceutical and therapeutic uses. Further studies are needed with this plant to dissociate, characterize and illustrate the compounds.

CONSENT

It's not applicable.

ETHICAL APPROVAL

It's not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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