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PRELIMINARY PHYTOCHEMICAL, BIOCHEMICAL AND FTIR SPECTROSCOPIC ANALYSIS OF KUPPAIMENI CHOORANAM (ACALYPHA INDICA LINN)

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ABSTRACT

The Siddha System of medicine is one of the most ancient traditional systems of India. The Kuppaimeni chooranam (*Acalypha indica* Linn) is a herbal formulation from Gunapadam - Mooligai Vaguppu text book. The Kuppaimeni chooranam is indicated for Iraippu irumal (Bronchial Asthma). The raw drug was collected and purified as mentioned in siddha classical literatures. The study was carried out to evaluate the preliminary phytochemical, biochemical and FTIR spectroscopic analysis of Kuppaimeni chooranam (KC). In phytochemical screening Saponins, terpenoids, steroids, Glycosides, Alkaloids were pesent. The biochemical analysis revealed the presence of sulphate, chloride, unsaturated compounds and amino acid. The FTIR characterization showed the presence of functional groups like N-H stretch (Aliphatic primary amine), C-H stretch (Alkane), C=O stretch (esters), C=C stretch (Alkene), C-H bending(Alkane), OH bending (Phenol), C-O stretch (Alkyl aryl ether), C-O stretch (secondary alcohol), S=O stretch (Sulfoxide), C=C bending (Alkene), C-Cl stretch (Halo compound) and C-I stretch (Halo compound).

KEYWORDS: *Acalypha indica* Linn, Bronchial asthma, Phytochemical, Biochemical, FTIR spectroscopy.

INTRODUCTION

The Siddha system of Medicine is one of the traditional medical systems, providing preventive, promotive, curative, rejuvenative and rehabilitative health care by adopting scientific and holistic approach. Kuppaimeni chooranam (*Acalypha indica* Linn) is a herbal formulation.[1,2] *Acalypha indica* Linn is a common herb, found mostly in the backyards of houses and waste places throughout the plains of India. Plants are emetic, expectorant, laxative and diuretic; useful in bronchitis, pneumonia, asthma and pulmonary tuberculosis.[3] The plant contains kaempferol, a cyanogenetic glucoside, a base, triacetonamine and an alkaloid, acalyphine. It also contains the amide, acalyphamide and some other amides, 2-methylanthraquinone, tri-o-methyl ellagic acid and sitosterol, β-sitosterol, β-sitosterol glucoside, stigmasterol, n-octacosanol, quinine, tannin, resin and essential oil.[4]

The phytochemicals are naturally present in the plants and showed biological significance by playing an essential role in antimicrobial activity by inhibition or killing mechanisms. The secretion of these compounds varies from plant to plant. Some produce more and others in minimal quantity.[5] Plants provide rich resources for natural biochemicals. FTIR spectroscopy would allow accurate and precise assessment of the functional groups, bonding types, and molecular conformations. Spectral bands in vibrational spectra are molecule specific and provide direct information about the biochemical composition.[6]

MATERIALS AND METHODS

The plant *Acalypha indica* Linn were collected from Palayamkottai area and authenticated by the Department of Medicinal botany, Government Siddha Medical College, Palayamkottai. The leaves of the plant were dried in shade, powdered and stored in air tight containers.

Preliminary phytochemical analysis

Phytochemicals are chemical compounds formed during the normal metabolic processes in plants. These chemicals are often referred to as secondary metabolites.[7] The phytochemical studies include the tests for saponins, tannins, terpenoids, phenols, steroids, quinones, antraquinones, glycosides, carbohydrates, alkaloids, lignans, flavanoids and proteins.

Biochemical analysis

The biochemical studies include the tests for calcium, sulphate, chloride, carbonate, starch, ferric iron, ferrous iron, phosphate, albumin, tannic acid, unsaturation, reducing sugar, amino acid and zinc.

Ftir spectroscopy

Fourier Transform Infrared spectroscopy, also called FTIR analysis or FTIR spectroscopy is an important and more advanced technique to identify the functional group. The spectrum that appears denotes the molecular absorption and transmission. It forms the molecular finger print of the sample. Like the finger print there is no two unique molecular structures producing the same infrared spectrum. It is recorded as the wave number and the peaks observed in the spectrum indicates the amount of material present.

RESULTS AND DISCUSSION

Preliminary phytochemical analysis

The preliminary phytochemical screening data for Kuppaimeni chooranam are given in Table 1.

Table 1: Preliminary phytochemical analysis of kuppaimeni chooranam.

Sl. No.	Tests	Result
1	Saponins	+
2	Tannins	-
3	Terpenoids	+
4	Phenols	-
5	Steroids	+
6	Quinones	-
7	Antraquinones	-
8	Glycosides	+
9	Carbohydrates	-
10	Alkaloids	+
11	Lignans	-
12	Flavanoids	-
13	Proteins	-

+ Present, - Absent

The preliminary phytochemical analysis as in Table 1 showed the presence of Saponins, terpenoids, steroids, Glycosides and Alkaloids**.** Saponins are glycosidic in nature and have expectorant and cardiotonic activity.[8,9]

Biochemical analysis

The biochemical analysis results for Kuppaimeni chooranam are given in Table 2.

Table 2: Biochemical analysis of kuppaimeni chooranam.

S. No.	Tests	Result
1	Calcium	-
2	Sulphate	+
3	Chloride	+
4	Carbonate	-
5	Starch	-
6	Ferric iron	-
7	Ferrous iron	-
8	Phosphate	-
9	Albumin	-
10	Tannic acid	-
11	Unsaturated compound	+
12	Reducing sugar	-
13	Amino acid	+
14	Zinc	-

+ Present, - Absent

The biochemical analysis as in Table 2 revealed the presence of Sulphate, Chloride, Unsaturated Compounds and Amino acid.

Fourier transform infrared spectroscopic analysis (FTIR Spectroscopy)

Fourier Transform Infrared spectroscopy, also called FTIR analysis is an important and more advanced technique to identify the functional group. Instrument model (FT-WIN) was used to derive the FTIR spectra of Kuppaimeni chooranam. Fig 1 shows the FTIR spectrum for alcoholic extract of Kuppaimeni chooranam.

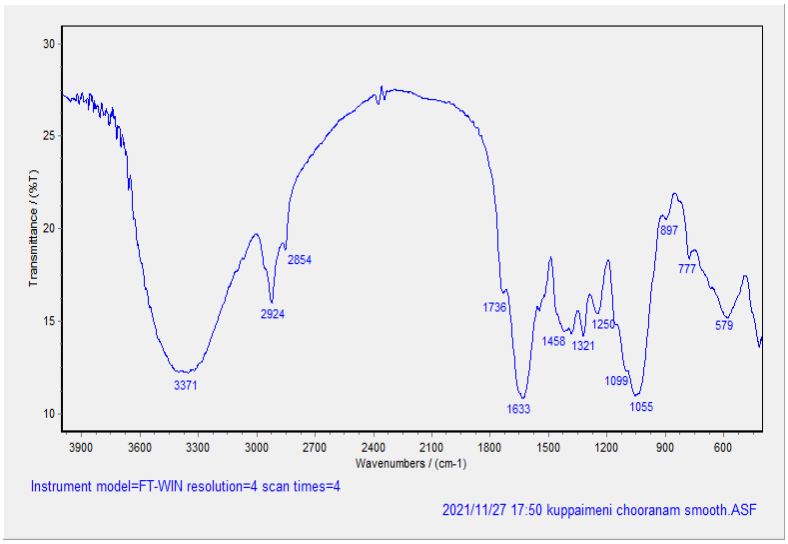

Fig. 1: FTIR spectrum for alcoholic extract of kuppaimeni chooranam.

In Table 3, the FTIR spectroscopic analysis of Kuppaimeni chooranam is given. It shows the absorption value in cm^{-1}, appearance, functional group and the compound present in it.

Table 3: FTIR Spectrosopic analysis of kuppaimeni chooranam.

S. No.	Absorption (cm^{-1})	Appearance	Functional group	Compound class
1	3371	Medium	N-H Stretching	Aliphatic primary amine
2	2924	Medium	C-H stretching	Alkane
3	2854	Medium	C-H stretching	Alkane
4	1736	Strong	C=O stretching	Esters
5	1633	Medium	C=C stretching	Alkene
6	1458	Medium	C-H bending	Alkane
7	1321	Medium	OH bending	Phenol
8	1250	Strong	C-O stretching	Alkyl aryl ester
9	1099	Strong	C-O stretching	Secondary alcohol
10	1055	Strong	S=O stretching	Sulfoxide
11	897	Strong	C=C bending	Alkene
12	777	Strong	C-Cl stretching	Halo compound
13	579	Strong	C-Br stretching	Halo compound

The FTIR characterization of Kuppaimeni Chooranam in Table 3 showed the presence of functional groups like N-H stretch (Aliphatic primary amine), C-H stretch (Alkane), C=O stretch (esters), C=C stretch (Alkene), C-H bending (Alkane), OH bending (Phenol), C-O stretch (Alkyl aryl ether), C-O stretch (secondary alcohol), S=O stretch (Sulfoxide), C=C bending (Alkene), C-Cl stretch (Halo compound) and C-I stretch (Halo compound).

CONCLUSION

The plant Acalypha indica Linn is having an important role in the treatment of Iraippu Irumal (Bronchial Asthma). The preliminary phytochemical analysis showed the presence of Saponins, terpenoids, steroids, Glycosides and Alkaloids which are compounds capable of causing varied physiochemical and pharmacological effects. The presence of Saponins, terpenoids, and sterioids are having antioxidant activity which is helpful for the treatment of Bronchial asthma.The biochemical analysis revealed the presence of Sulphate, Chloride, Unsaturated Compounds and Amino acid. The FTIR characterization of Kuppaimeni Chooranam showed the presence of functional groups like N-H stretch (Aliphatic primary amine), C-H stretch (Alkane), C=O stretch (esters), C=C stretch (Alkene), C-H bending (Alkane), OH bending (Phenol), C-O stretch (Alkyl aryl ether), C-O stretch(secondary alcohol), S=O stretch (Sulfoxide), C=C bending (Alkene), C-Cl stretch (Halo compound) and

C-I stretch (Halo compound). The presence of characteristic functional groups are responsible for various medicinal properties of *Acalypha indica* Linn.

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