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Research Article

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Evaluation of Functional group in Herbal formulation Mavilingapattai kudineer through Fourier Transform Infrared Spectroscopic study.

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Abstract

Background: The Siddha system of medicine is one among the AYUSH system in India. The Siddha medicine is used to treat various diseases, especially in Vatha diseases. In Siddha system, medicine are prepared from herbals, minerals, salts and metals as well as the marine and animal products. The Siddha formulation of Mavilingapattai kudineer is a mono-herbal drug used for the treatment of Thandagavatham (Lumbar spondylosis). **Aim:** The aim of study to evaluating the morphology and elemental characterization of the Mavilingapattai kudineer. The functional groups of their formulations are analysed through FTIR spectroscopy and the biological roles of the functional groups are discussed in this study. **Materials and methods:** The ingredient are collected purified the drug as per Siddha literature Gunapadam pagam-1 (Mooligai Vaguppu) author of Vaithiya Rathinam Dr.K.S Murugesa Muthaliar. The drug was subjected into characterisation through FT-IR analysis. **Results:** The FT-IR characterization showed the presence of functional groups N-H Stretching (Aliphatic primary amine),C-H Stretching (Alkane),C=N Stretching(Imine/Oxime),C-H bending (Alkane)O-H bending(Carboxylic acid),C-O Stretching(Aliphatic ether),C-O Stretching (Alkyl aryl ether), S=O Stretching (Sulfoxide), C-cl Stretching (Halo compound),C-Br Stretching (Halo compound)and C-I Stretching(Halo compound) which ensures the therapeutic effect of the drug. **Conclusion:** The instrumental analysis FT-IR study for Mavilingapattai kudineer showed the presence of functional groups through the stretch and bends which is responsible for its functional activity. The functional groups present in the sample Mavilingapattai kudineer have analgesic, anti-inflammatory activities. This will ensure the efficacy and therapeutic effect of the drug Mavilingapattai kudineer. This study forms the base for the pharmaceutical analysis of the Mavilingapattai kudineer

Keywords: FT-IR, Mavilingapattai kudineer, Crataeva magna, functional groups, siddha medicine, Thandagavatham, Lumbar spondylosis

Introduction

The World Health Organization(WHO) estimated that 80% of population have used traditional medicine in developing countries for primary health care needs (WHO Guidelines-2017)In that way, Siddha medicine, has profound vital role in management of diseases and prophylaxis though it's herbals minerals and metals. According to siddha medicinal system, diet and lifestyle play a major role in health and curing diseases. it emphasizes on the patient, environment, age, sex, race, habit, mental framework, Habit, diet, appetite, physical condition, physiological constitution of the disease for the treatment which is individualistic in nature. Mavilingapattai kudineer is a siddha formulation .It is indicated as a good drug for vadha disease mentioned in classical Siddha literature. Gunapadam mooligai vaguppu. There is no scientific foot prints are available regarding this formulation. FTIR characterization was done for this siddha formulation to evaluate functional groups identification. It is an excellent tool for qualitative analysis.

For the development of a new drug Scientific validation of safety and efficacy of the each and every drug before going to administration in human beings are essential in the current era. In order to develop new drug strategy or standardization of the traditional Siddha formulation through characterization using sophisticated modern equipment is an emergence need to strengthen to field of pharmacolgy.

Fourier Transform Infrared (FTIR) spectroscopy is an analytical methodology used in industry and academic laboratories to understand the structure of individual molecules and the composition of molecular mixtures. FTIR spectroscopy uses modulated, mid-infrared energy to interrogate a sample. The infrared light is absorbed at specific frequencies directly related to the atom-to-atom vibrational bond energies in the molecule. When the bond energy of the vibration and the energy of mid-infrared light are equivalent, the bond can absorb that energy. Different bonds in a molecule vibrate at different energies, and therefore absorb different wavelengths of the IR radiation. The position (frequency) and intensity of these individual absorption bands contribute to the overall spectrum, creating a characteristic fingerprint of the molecule. FT-IR is one of the important analytical techniques which is used to determine the organic compounds , including chemical bond, as well as organic content (eg.protein, carbohydrate and lipid).In this article discussed about Mavilingapattai kudineer shows subjected to access the functional groups present in the drug, used FT-IR instrument.

Materials and Methods

Trial drug selection:

The details about the siddha formulation *Mavilingapattai kudineer*was acquired from Siddha text Gunapadam pagam-1 (Mooligai Vaguppu) author of Vaithiya Rathinam Dr.K.S Murugesa Muthaliar.

Collection of raw materials:

Required raw drug was collected from the herbal drug shop, Thackkalay, kanyakumari district, Tamilnadu

Authentication of raw materials:

The raw drug was identified and authenticated by the Medicinal Botanist and Gunapadam experts at Government Siddha Medical College and Hospital, Palayamkottai-627002.

Process of preparation:

The adulterants, dust and other materials in the barks were removed.

Method of preparation

The trial drug is purified dried and grinded into kudineer chooranam.10gm of kudineer chooranam is added with 400ml of water &boiled untill it is reduced into ¼ of its quantity and make kashayam to dispensing (Table .1)

Table 1:Ingredients of Mavilingapattai kudineer.

S.No	Tamil Name	Scientific name	Parts Used	Quantity
1.	Mavilingapattai	*Crataeva magna* (Linn)Benth.	Stem barks	Q.S

Results and Discussion

FT-IR Analysis:

FT-IR Spectra were recorded at Mavilinga pattai kudineer Siddha Regional Research Institute, Poojappura, Thiruvananthapuram, Kerala. Instrument model=FT-WIN was used to derive the FT-IR Spectra of Mavilingapattai kudineer.The test drug was identified to have 8 peaks. They represents functional group presents in the Mavilingapattai kudineer. The FTIR analysis of Mavilinga pattai kudineer shows the spectrum that appears which denotes the molecular absorption and transmission. It forms the molecular finger print of the sample. It is the functional group and determine the amount of compound present in the sample. The functional groups are responsible for the therapeutic effect of the drug.

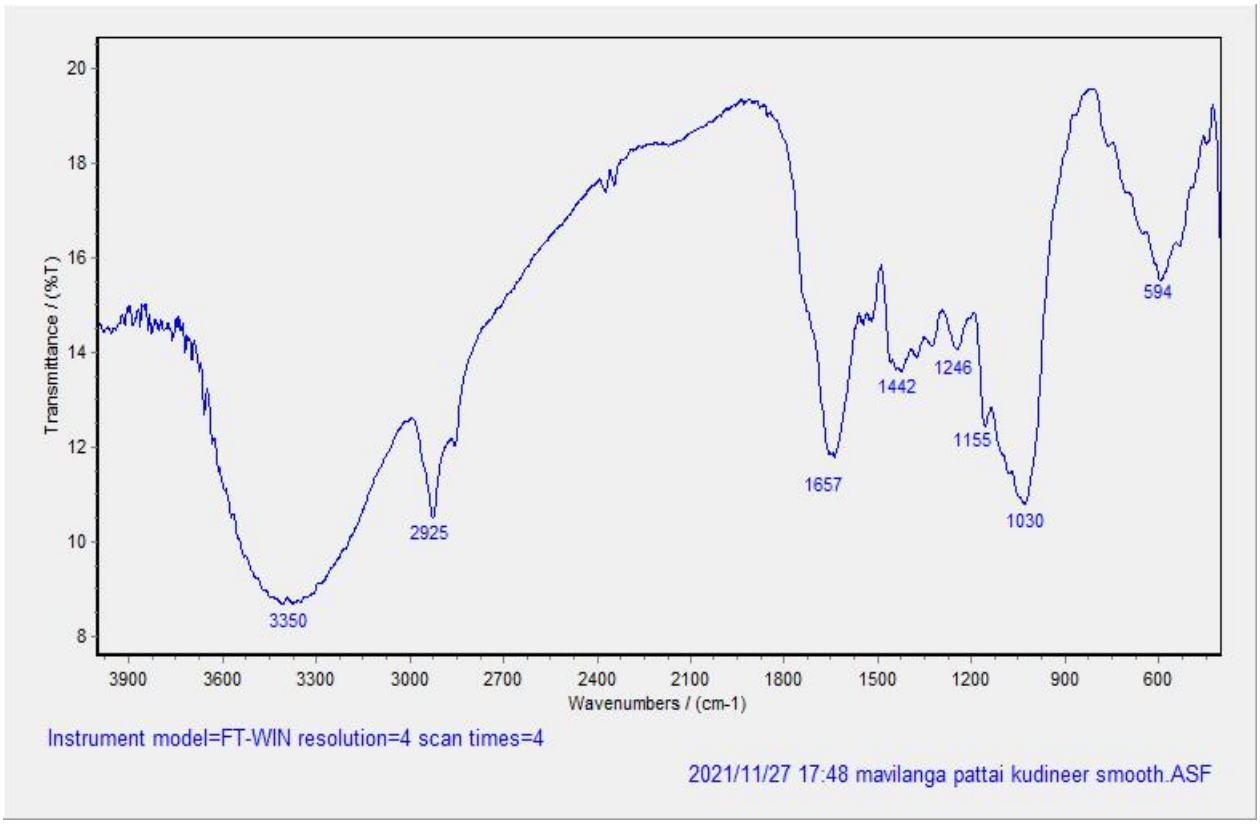

Figure 1:FT-IR Spectra of Mavilingapattai kudineer.

Table 2 : Functional groups for peak values

S.No	Wave Number(cm^{-1})	Vibrational Modes of Mavilinga pattai kudineer in IR region	Functional groups
1	3350	N-H Stretching	Aliphaticprimary amine
2	2925	C=H Stretching,	Alkane
3	1657	C=NStretching C-H bending	Imine/Oxime Alkane
4	1442	O-H Bending	Carboxylic acid
5	1246	C-O Stretching	Alkyl aryl ether
6	1155	C-Ostretching	Alephatic ether
7	1030	S =O stretching	Sulfoxide
8	594	C-cl stretching C-Br Stretching C-I Stretching	Halo compound. Halo compound Halo compound

From the above analysis ,the test drug Mavilinga pattai kudineer is contains Aliphatic primary amine, Alkane, imine/Oxime, Carboxylic acid, Alkyl aryl ether, Aliphatic ether, sulfoxide and Halo compound were present. The above compounds have some pharmaceutical properties and are responsible for the therapeutic action of the drug. Some component therapeutic uses are briefly discussed below. (Table.2)

Aliphatic primary amines

Aliphatic amines are generally too sterically hindered to contribute much to the cure.Aliphatic amines constitute the largest group of epoxy curing agents. They can be used as is or adducted to modify volatility, toxicity, reactivity, and stoichiometry.

Amines:

Biological amines have analgesic properties[10.]Amines have anti-inflammatory properties[11].

Imine

Synthetize 12 resveratrol analogues (6 imines, 1 thioimine and 5 hydrazones) and investigated its cytotoxicity, antioxidant activity and in vitro anti-inflammatory/immunomodulatory properties. The most promising compounds were also evaluated in vivo. The results showed that imines presented less cytotoxicity, were more effective than resveratrol on DPPH scavenger and exhibited an anti-inflammatory profile. An immunomodulatory activity also was observed in these molecules. Imines suggest presents potential action to control inflammatory disorders.

Sulfoxide

Dimethylsulfoxide is used topically to decrease pain and speed the healing of wounds, burns, and muscle and skeletal injuries. Dimethylsulfoxide is also used topically to treat painful conditions such as headache, inflammation, osteoarthritis, rheumatoid arthritis, and severe facial pain called tic douloureux.

Carboxylic acid – Analgesic, Anti pyretic, Anti inflammatory, but is mainly usedas analgesic in the short-term management of moderate to severe pain. Carboxylic acid in the highest primary functional group of Acetyl salicylic acid. It has antiplatelet activity, which prevent clot formation.

Conclusion

The spectroscopic standardization of the drug sample Mavilingapattai kudineer. It is known to have the functional groups like compound).The functional groups present in the sample Mavilingapattai kudineer have Aliphatic primary amine, alkane, Imine/Oxime, carboxylic acid, alkyl aryl ether, Aliphatic ether, Sulfoxide, halo compounds. Presence of these active components will ensures quality, efficacy and therapeutic effect of the drugMavilingapattai kudineer. This study forms the base for the pharmaceutical analysis of the Mavilingapattai kudineer. These findings will give valuable information for future clinical research.

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