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Evaluation of Functional group in herbal formulation Kaattu Vakai Pattai Chooranam through Fourier Transform Infrared Spectroscopic study.

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Abstract

Background:

The Kaattu Vakai Pattai Chooranam is a mono-herbal drug used for the treatment of Raththa Moolam (Bleeding haemorrhoids).

Objective:

The aim of the study is to evaluate the morphology and elemental characterization of the Kaattu Vakai Pattai Chooranam.

Materials and methods:

The ingredients were collected and purified and the drug was prepared as per Siddha literature "Gunapadam (First Edition Mooligai Vaguppu)". The drug was subjected into characterisation through FT-IR analysis.

Results:

The FT-IR characterization showed the presence of functional groups like O-H Stretch (Alcohol and Carboxylic acid), C=C Stretch (Conjugated alkene and Cyclic alkene), N-H Bending (Amine), N-O Stretching (Nitro compound), C-F Stretching (Fluoro compound), C-N Stretching (Amine), C-O Stretching (Primary alcohol), C=C Bending (Alkene), C-H Bending (1,2,3-trisubstituted), 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 Kaattu vakai pattai chooranam 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 Kaattu Vakai Pattai Chooranam have analgesic, anti-inflammatory, styptic and laxative activities.

This will ensure the efficacy and therapeutic effect of the drug Kaattu Vakai Pattai Chooranam. This study forms the base for the pharmaceutical analysis of the Kaattu Vakai Pattai Chooranam.

Keywords: FT-IR, Kaattu Vakai Pattai Chooranam, functional groups, herbal siddha formulation, Bleeding haemorrhoids, Raththa Moolam.

Introduction

Siddha Science is a well defined Science which was originated in the erstwhile Lemurian continent and followed by Dravidians, thousands of years before the advent of any other systems of medicine. It is a medical science through which the body as well as the soul are treated. It comprises of four main branches called Vatham, Maruthuvam, Yogam and Gnanam^[4]. Unlike in other systems of Medicine, Siddha medicine is not a separate entity. It is part and parcel of our daily diet and our hygienic principles start from daily ablutions, community ceremonies, etc^[14]. Siddha System of Medicine has a distinctive approach to care specific ailments and also to build up immunity power of the person being treated against all diseases. The major strength of this Siddha System is, its easy accessibility, naturalness of the products and cost effectiveness. Moreover it is affordable and acceptable^[10].

The mono-herbal drug Kaattu Vakai Pattai Chooranam^[12] is taken from the classical Siddha literature Gunapadam (First Edition Mooligai Vaguppu). This is used to treat Raththa moolam

(Bleeding haemorrhoids). The ingredient was the stem barks of the tree Kaattu Vakai-*Albizia lebeck* (Linn) Benth.

In this article, discussed about the functional groups present in the drug, using FT-IR instrument.

Materials and Methods

Collection of raw materials:

The raw drug was collected from the foothills of Kolli malai, Namakkal.

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.

Process of preparation:

The adulterants in the barks were removed and dried in the shade. The barks were powdered and sieved using a fine cloth and then bottled up.

Table 1: Ingredients of Kaattu Vakai Pattai Chooranam.

S.No	Tamil Name	Scientific name	Parts Used	Quantity
1.	Kaattu Vakai Pattai	<i>Albizia lebeck</i> (Linn)Benth.	Stem barks	Q.S

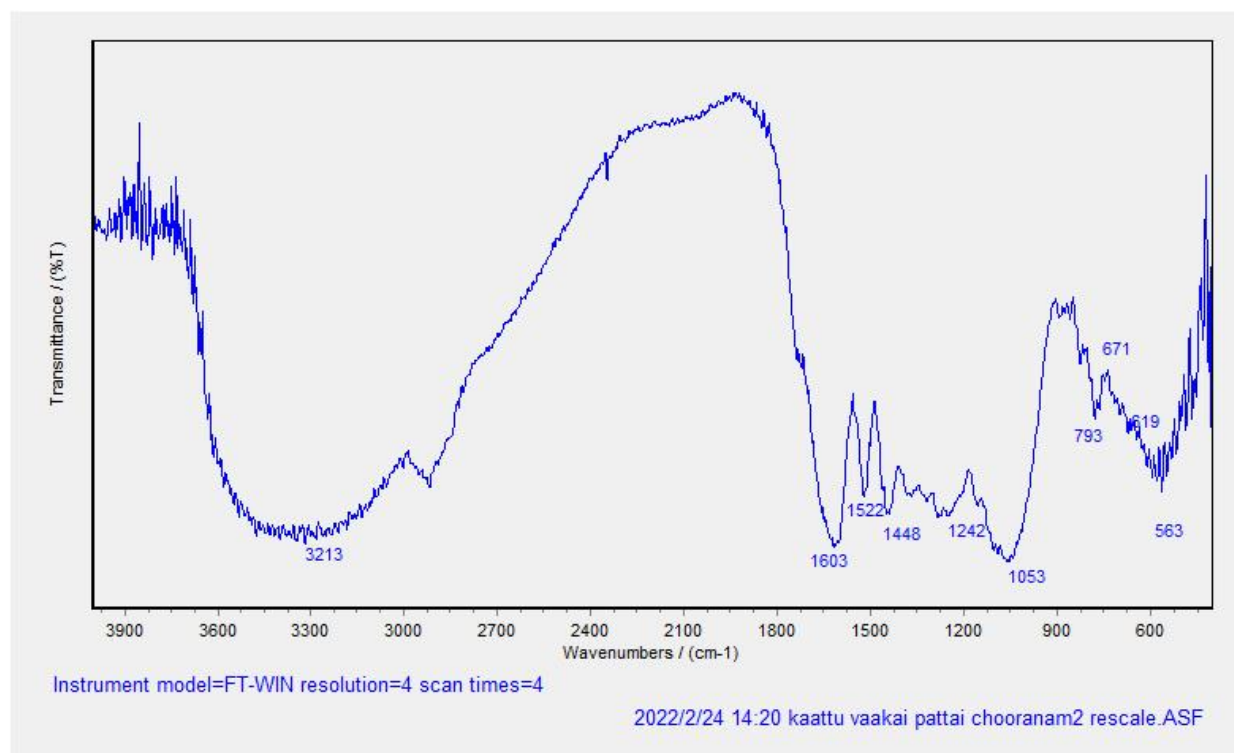
Results and Discussion

FT-IR analysis:

FT-IR Spectra were recorded at Siddha Regional Research Institute, Poojappura,

Thiruvananthapuram, Kerala. Instrument model=FT-WIN was used to derive the FT-IR Spectra of Kaattu Vakai Pattai Chooranam.

Figure 1: FT-IR Spectra of Kaattu Vakai Pattai Chooranam.



S.No	Wave Number(cm^{-1})	Vibrational Modes of Kaattu Vakai Pattai Chooranam in IR region	Functional groups
1	3213	O-H Stretching	Alcohol, Carboxylic acid.
2	1603	C=C Stretching, N-H Bending	Conjugated alkene, Amine, Cyclic alkene.
3	1522	N-O Stretching	Nitro compound.
4	1242	C-F Stretching	Fluoro compound.
5	1053	C-N Stretching, C-O Stretching	Amine, Primary alcohol.
6	793	C=C Bending, C-H Bending	Alkene, 1,2,3-trisubstituted.
7	671	C-Br Stretching	Halo compound.
8	619	C-Br Stretching	Halo compound.
9	563	C-I Stretching	Halo compound.

From the above analysis^[10], Kaattu Vakai Pattai Chooranam contains Alcohol, Carboxylic acid, Conjugated alkene, Amine, Cyclic alkene, Nitro compound, Fluoro compound, Primary alcohol, Alkene, 1,2,3-trisubstituted, Halo compound. These above compounds have some pharmaceutical properties and are responsible for the therapeutic action of the drug. They are briefly discussed below.

Alcohol:

Moderate alcohol consumption reduces biomarkers of inflammation, including c-reactive protein (CRP), interleukin-6, and TNF-alpha receptor 2," says Karen Costenbader, MD, MPH, a rheumatologist at Brigham and Women's Hospital in Boston. Alcohol's anti-inflammatory effects are also thought to be one of the reasons it appears to lower cardiovascular disease risk in moderate drinkers^[7]. Alcohol is an effective analgesic that delivers clinically-relevant

reductions in ratings of pain intensity^[15]. It can be applied to skin fissures, canker sores and fever blisters as a styptic and antiseptic^[13].

Carboxylic acid:

It has analgesic, antipyretic, and anti-inflammatory activity^[6]. Non-steroidal anti-inflammatory drugs (NSAIDs) with free carboxylic acids are used worldwide to treat inflammatory and immune diseases such as pain, rheumatoid arthritis, and cancer^[9].

Amine:

Biological amines have analgesic properties^[16]. Amines have anti-inflammatory properties^[2].

Nitro compound:

The possibility of the preclinical validation of these molecules as anti-inflammatory and analgesic was explored in appropriate in vivo mouse models^[5]. Magnesium sulphate was studied for its effects on diarrhoea, fluid secretion, gastrointestinal transit and nitric oxide (NO) synthase activity in rats^[11].

Fluoro compound:

The physicochemical properties and analgesic action of six fluorinated analogues of 4-hydroxyacetanilide (paracetamol) have been investigated. Fluorine substitution adjacent to the hydroxyl group increased lipophilicity and oxidation potential whilst substitution adjacent to the amide had little effect on lipophilicity but led to a greater increase in oxidation potential^[3].

Conclusion

The Kaattu Vakai Pattai Chooranam have the functional groups like O-H Stretch(Alcohol and Carboxylic acid),C=C Stretch(Conjugated alkene and Cyclic alkene),N-H Bending(Amine),N-O Stretching (Nitro compound),C-F Stretching (Fluoro compound),C-N Stretching(Amine),C-O Stretching (Primary alcohol), C=C Bending (Alkene)C-H Bending(1,2,3-trisubstituted),C-Br

Stretching (Halo compound),and C-I Stretching(Halo compound).

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