

Evaluation of Herbal Formulation of Saaranai Chooranam Through Fourier Transform Infrared Spectroscopic Study

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ABSTRACT

Background: The Siddha system of medicine is purely scientific and the peculiar complex system of science and philosophy. Fourier Transform Infrared Spectroscopy (FTIR) is certainly one of the most important analytical techniques for herbal medicine. FTIR can be implemented during herbal drug development in production for process monitoring or in quality control laboratories.

Aim & Objective: The aim of study is to evaluate the morphology and elemental characterization of the Saaranai chooranam. 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 raw drugs are collected and purified as per Siddha literature. Drug Saaranai chooranam, which has been illustrated in the text Dr.S.Venkattarajan, Akasthiyar-2000, Part – III, Page: 102, for the management of Raththa Kothippu (Systemic Hypertension).

Results: The Fourier Transform Infrared Spectroscopy compounds showed the presence of functional groups O-H Stretching (Alcohol), C-H Stretching (Alkane), O=C=O Stretching (Carbon dioxide), C-C bending (Alkene), O-H bending (Carboxylic acid), C-O Stretching (Aromatic ester), C-O Stretching (Tertiary alcohol), S=O Stretching (Sulfoxide), C-H bending (1,2-disubstituted) and C-I Stretching (Halo compound) which ensures the therapeutic effect of the drug.

Conclusion: The instrumental analysis FT-IRS study of Saaranai chooranam is the presence of functional groups through the stretch and bends which is responsible for its functional activity. The functional groups in Saaranai chooranam have diuretic and nervin tonic activities. This will ensure the efficacy and therapeutic effect of the drug.

Keywords: Fourier Transform Infrared Spectroscopy; Saaranai chooranam; Akasthiyar-2000; Raththa kothippu.

Introduction

The Siddha system of medicine is purely scientific and the peculiar complex system of science and philosophy. The Fourier Transform Infrared Spectroscopic is done for this siddha formulation Saaranai chooranam to evaluate the functional groups and interpretation of values. It is becoming a suitable technique for analysis of herbal medicine. It can be implemented during herbal drug development, in production for process monitoring, or in quality control laboratories. This is best tool for qualitative analysis or the invention of a new drug scientific validation of safety and efficacy of the each and every drug before going to administration in human beings are important. In order to develop new drug strategy or standardization of the traditional Siddha formulation through characterization using modern equipment is need to strengthen to field of pharmacology. Fourier Transform Infrared spectroscopy is an analytical methodology used in industry and academic laboratories to understand the structures. The applications of FTIR imaging and Nano-FTIR technique in biological samples lay a foundation for studying drug mechanism in vivo. The major advantage of IR spectroscopy over other spectroscopic techniques is that all the compounds virtually have absorption and thus can be analyzed both qualitatively and quantitatively. Fourier-transform infrared spectroscopy is originally a spectroscopic technique used to identify the functional groups of chemical substances, but in recent years it has been widely used to identify, control quality and monitor the manufacturing process of drug. This techniques has been recently proposed for quality control and geographical authentication of other botanical plants for medicinal and food purposes.

Materials and Methods

Trial drug selection

The details about the Saaranai chooranam is selected from Siddha text Dr.S.Venkattarajan, Akasthiyar-2000, Part – III, Page: 102.

Collection & Authentication of raw materials

The required raw materials for preparation of Saaranai chooranam is collected from in and around of Tirunelveli and authenticated by Botanist, department of medicinal botany, Govt. Siddha Medical College, Palayamkottai. The raw materials were purified and the medicine was prepared in the Govt. Siddha Medical College, Palayamkottai.

Method of preparation

The adulterants and dust were removed. Saaranai root thoroughly washed in water and soaked in cow's milk. After that it steamed in milk. Dried and grind into the fine powder sieved and add same quantity of Inthuppu. The drug will be labelled as Saaranai Chooranam (Table 1).

Table 1. Ingredients of Saaranai chooranam

Tamil name- English Name	Botanical name - Family	Part Used	Required Quantity
Saaranai Black pigweed/giant pigweed	<i>Trianthema portulacastrm</i> Aizoaceae	Root	100 grams
Inthuppu Rock salt	<i>Sodium chloridum impura</i>	Salt	100 grams

Dosage: 2 gram/twice a day

Administration: Oral

Adjuvant: Vellam

Results and Discussion

Fourier Transform Infrared Spectroscopy Analysis

FT-IR Spectra were carried in Saaranai chooranam at Siddha Regional Research Institute, Thiruvananthapuram. Instrument model=FT-WIN was used to derive the FTIR Spectra of Saaranai chooranam. The test drug was identified to have 13 peaks. They represents functional group presents in the Saaranai chooranam. The FTIR analysis of Saaranai chooranam 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 determines the amount of compound present in the sample. The functional groups are responsible for the therapeutic effect of the drug.

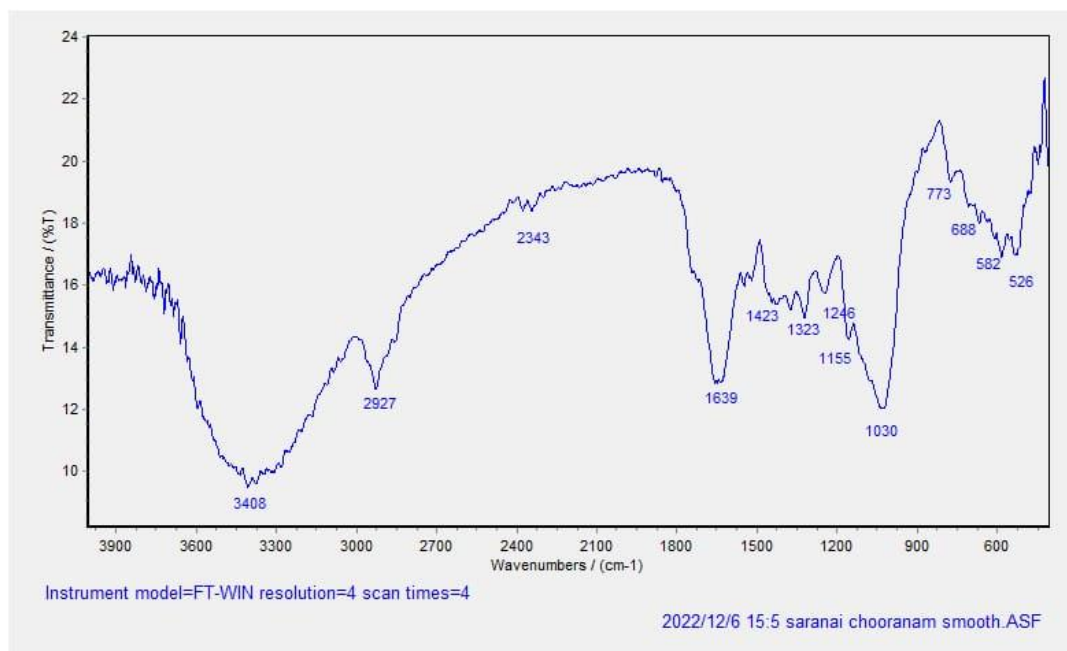


Figure 1. FTIR Spectra of Saaranai chooranam

Functional groups for peak values

S.No.	Absorption-Wave Number (cm ⁻¹)	Appearance	Vibrational Modes of Saaranai chooranam in IR region	Functional groups
1	3408	Strong, broad medium	O-H Sretching	Alcohol
2	2927	Medium, Weak broad	C-H Sretching	Aliphatic amine
3	2343	Strong	O=C=O Sretching	Alkene
4	1639	Strong	C=C Sretching	Carbon dioxide
5	1423	Medium	O-H Bending	Alkane
6	1323	Strong	C-O Sretching	Carboxylic acid
7	1246	Strong	C-O Sretching	Alkyl aryl ether
8	1115	Strong	C-O Sretching	Tertiary alcohol
9	1030	Strong	S=O Sretching	Sulfoxide
10	773	Strong	C-H Sretching	1,2-disubstituted
12	688	Strong	C-H Sretching	Halo compound
13	582	Strong	C-Br Sretching	Alkyl Halides

Above analysis revealed the Saaranai chooranam is contains Alcohol, Aliphatic amine, Alkene, Carbon dioxide, Alkane, Carboxylic acid, Alkyl aryl ether, Tertiary alcohol, Sulfoxide, 1,2-disubstituted, Halo compound, Alkyl Halides. The above compositions contains some pharmaceutical properties and responsible for the therapeutic action of the drug. Some component therapeutic uses are briefly discussed here.

1. Alcohol: Alcohol is reducing risk of developing heart diseases, Reducing the risk of ischemic heart disease, Help to prevent Diabetes mellitus. The lower level of protein in the urine is good for reducing the risk of kidney diseases, It can be applied to skin fissures, canker sores and fever blisters as a styptic and antiseptic.

2. Aliphatic amine: It is the important metabolic and physiological functions in human body. Essential for cell proliferation, growth, renewal of cells. It acts DNA , RNA and protein synthesis, Regulate the permeability and stability of cellular membranes.

3. Alkene: Medicinal use of Alkene is a topical analgesic used as an adjunct to relieve severe pain of osteoarthritis. It is biologically important molecules, such as proteins, lipids, nucleic acids and glycans ant it is used to treat psoriasis.

4. Carboxylic acid: Carboxylic acid in the main primary functional group of Acetyl salicylic acid. It has anti-platelet activity, which prevent clot formation, its beneficial for prevent hypertensive crisis. Carboxylic acids make up a series of fatty acids specially omega-3 fatty acids which are excellent for human health.

5. Sulfoxide: Used in topically to treat painful conditions such as headache, inflammation, Multiple joint pain decrease pain and speed the healing of wounds, burns and muscle, skeletal injuries.

6. Halo compound: Used in health industry to cure tooth decay.

7. Alkyl Halides: It is best antibiotic usage compounds, used to starting materials for the synthesis of wide range of organic compounds.

Conclusion

Fourier Transform Infrared Spectroscopy becoming a suitable technique for analysis of herbal medicine, identification of unknown compounds, quantitative information, such as additives/contaminants. Widely used confirm the composition of both solids, liquids and gases. The Fourier Transform Infrared Spectroscopy standardization of Saaranai chooranam is identified 13 peaks contains Alcohol, Aliphatic amine, Alkene, Carbon dioxide, Alkane, Carboxylic acid, Alkyl aryl ether, Tertiary alcohol, Sulfoxide, 1,2-disubstituted, Halo compound, Alkyl Halides. The above compositions contain some pharmacological actions and same responsible for the therapeutic action of the drug. Presence of these active components is confirmed the quality, efficacy and therapeutic effect of Saaranai chooranam. The functional groups present in the Saaranai Chooranam have Analgesic, Anti-inflammatory and Anti-oxidant activities. These results useful for further research studies related to Saaranai chooranam.

Declarations

Source of Funding

This study did not receive any grant from funding agencies in the public or not-for-profit sectors.

Competing Interests Statement

Authors have declared no competing interests.

Consent for Publication

The authors declare that they consented to the publication of this study.

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Ethical statement and Conflict of interest

The work presented here does not involve any experiment with human or animals.

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