

# Analysis and Characterization of Herbalsiddha Formulation *Vatha Siletpana Sura Kudineer* through Fourier Transform Infrared Spectroscopy

Vidhya Milano Prasad<sup>1</sup>, Antony Duraichi R<sup>2</sup>

<sup>1</sup>PG Scholar, Department of Gunapadam, Government Siddha Medical College, Palayamkottai, Tirunelveli, Tamil Nadu, India

<sup>2</sup> Lecturer, Department of Gunapadam, Government Siddha Medical College, Palayamkottai, Tirunelveli, Tamil Nadu, India

<sup>1</sup>Corresponding Author Email: [vidhyac0413\[at\]gmail.com](mailto:vidhyac0413[at]gmail.com)

**Abstract:** Siddha Medicine is one of the ancient Tamil medicine. Siddha medicines are used to treat various diseases. The *Vatha Siletpana Sura Kudineer* is a herbal drug of Siddha formulation used for the treatment of *vathakaphasuram* which has symptoms like cough, fever, breathing difficulty, aches and pains, sore throat, running nose, diarrhoea, nausea, loss of smell and taste, headache and chills. The objective of the present study is to characterize and assess the functional groups in herbal drug "*Vatha Siletpana Sura Kudineer*". The ingredients were collected & purified and the drug was prepared as per Siddha literature "*Pararajasekaram part III*". Here, the drug was subjected into characterization through FT – IR analysis. FT – IR characterization applied in the mid infrared region 4000  $\text{cm}^{-1}$  to 400  $\text{cm}^{-1}$  revealed the presence of functional groups like O-H stretch, O=C=O stretch, O-N-O stretch, C-N stretch, C-O stretch, C=C bend, C-Cl stretch, C-Br stretch, C-I stretch respectively. This peak indicates the presence of some organic functional groups such as carboxylic acid, nitro compounds, amine, tertiary alcohol, alkenes, alkyl & aryl halides which ensure the efficacy and therapeutic effect of the drug. These characterized functional groups are analysed through research papers from journals which provides the information that they have anti inflammatory, analgesic, antioxidant, anti pyretic, bronchodilator, anti nociceptive, anti tussive activities. These activities resembles the indications mentioned in Siddha text book for *Vatha Siletpana Sura Kudineer*.

**Keywords:** FT – IR, *Vatha Siletpana Sura Kudineer*, herbal siddha formulation, functional groups

## 1. Introduction

Siddha system is one of the most conservative medical systems in the world. In the field of medicine, Siddhars enlightened the world to save the human lives from various diseases. Siddha system of medicine use plants, minerals and animal products as main ingredient to cure various ailments. It is more widely used for the human ailments from time immemorial. *Vatha Siletpana Sura Kudineer* has been mentioned in Siddha texts for the management of *vathakaphasuram*. It is used in the treatment of symptoms like cough, fever, breathing difficulty, aches and pains, sore throat, running nose, diarrhoea, nausea, loss of smell and taste, headache and chills.

Siddha Herbal formulations are gaining popularity worldwide due to the presence of minimal side effect and easy usage. Therapeutic activity of a herbal formulation depends on its phytochemical constituents. Standardization is a system that ensures a predefined amount of quantity, quality and therapeutic effect of ingredients in each dose. Standardization is an important step for the establishment of a consistent biological activity, a consistent chemical profile, or simply a quality assurance program for the manufacturing of an herbal drug.

For the development of a new drug or the standardization of the traditional Siddha formulations through characterization, usage of modern sophisticated equipments is an emergency need to strengthen the field of Pharmacology. 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 the drug *vathasiletpanasurakudineer* is subjected to access the functional groups present in the drug, with the help of FT – IR instrument.

## 2. Materials and Methods

In the present study, Herbal preparation (*vathasiletpanasurakudineer*) has been selected to establish its standardization status from the classical Siddha literature. The key ingredients used in the formulation were listed below. Purification and Preparation of the *vathasiletpanasurakudineer* was carried out as per classical text literature mentioned. The drugs are authenticated at Department of Gunapadam, Government Siddha Medical College, Palayamkottai.

## 3. Ingredients of Drug

*Kandankathari (Solanum xanthocarpum)* – 1 palam (35 g)  
*Siruthekku (Clerodendrum serratum)* – 1 palam (35 g)  
*Kaddukai (Terminalia chebula)* – 1 palam (35 g)  
*Seenthil (Tinospora cordifolia)* – 1 palam (35 g)  
*Patpaddakam (Mollugo cerviana)* – 1 palam (35 g)  
*Kottam (Saussurea lappa)* – 1 palam (35 g)  
*Thippili (Piper longum)* – 1 palam (35 g)  
*Kachcholam (Kaempferia galanga)* – 1 palam (35 g)  
*Sittarathai (Alpinia officinarum)* – 1 palam (35 g)

**Preparation**

Raw drugs are collected and cleaned properly. Purification is done for the required drugs. Decoction is prepared according to the method mentioned in Siddha Book.

**Dosage:** 30 – 60ml – Twice a day.

**Indication:**

- Perumuchu (Breathing difficulty)
- Irupal (Cough)
- Suram (Fever)
- Vekkam (Swelling)
- Vanthi (Vomiting)
- Kathadaippu (unable to hear)
- Kulirnadukkam (Chills)
- Mugamvaattal (Dryness in face)
- nithraiynmai (insomnia)

**FT-IR Analysis**

FTIR (Fourier Transform Infra-red Spectroscopy) is a sensitive technique particularly for identifying organic chemicals in a whole range of applications although it can also characterise some inorganics. Examples include paints, adhesives, resins, polymers, coatings and drugs. FTIR is an effective analytical instrument for detecting functional groups. FTIR analysis was done at International Research

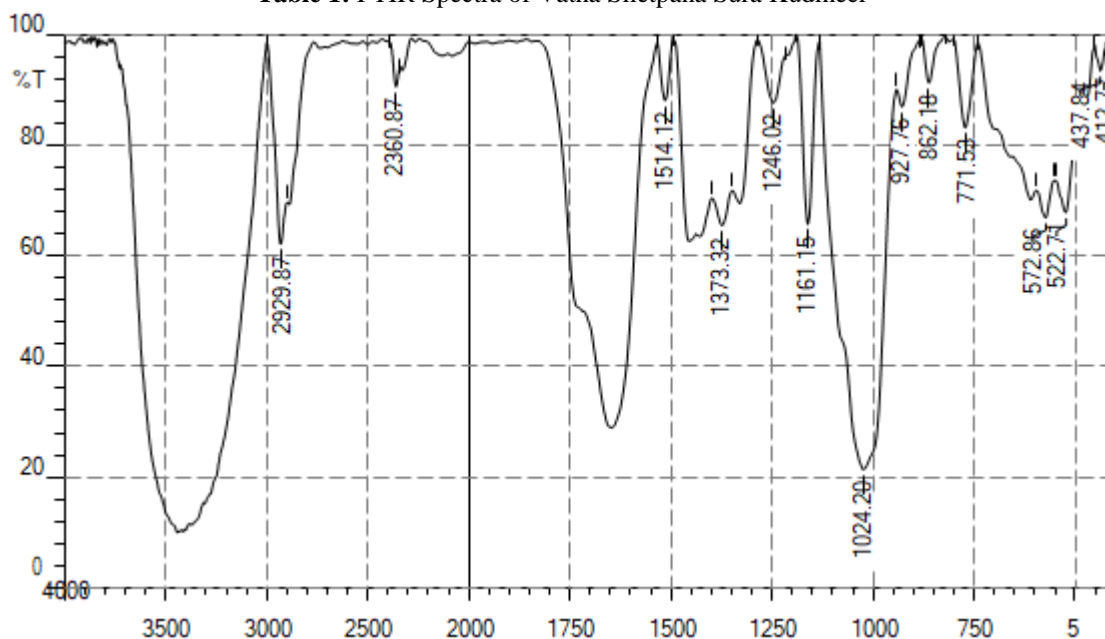
Centre, Kalasalingam Academy of Research and Education, Krishnankoil.

The analysis was carried out using IRTRACER-100. The IRTracer-100 FTIR Spectrophotometer has an enhanced interferometer and detector design, and it offers excellent sensitivity with a 60, 000: 1 S/N ratio. When the Lab Solutions IR Contaminant Analysis Macro is combined with the sensitivity; faster, easier, and more precise analysis of small samples can be performed. The IRTracer-100 system can be customized by the user, with a range of accessories and user-friendly software options to meet the needs of a specific application.

Potassium Bromide (KBr) matrix with scan rate of 20 spectra per second at the resolution 0.25 cm<sup>-1</sup> in the wave number region 400 – 4000 cm<sup>-1</sup>. The samples were ground to fine powder using agate motor and pestle and then mixed with KBr. They were pelletized by applying pressure to prepare the specimen (the size of specimen about 13 mm diameter and 0.3 mm in thickness) to recorded the FT – IR spectra under Standard conditions.

**4. Results**

**Table 1:** FTIR Spectra of Vatha Siletpana Sura Kudineer



**Table 2:** FTIR Interpretation of Vatha Siletpana Sura Kudineer

| S. No | Wave Number (cm <sup>-1</sup> ) | Vibrational Modes of SMC in IR Region | Functional groups    |
|-------|---------------------------------|---------------------------------------|----------------------|
| 1     | 412.77                          | C-I Stretching                        | Alkyl & Aryl Halides |
| 2     | 437.84                          | C-I Stretching                        | Alkyl & Aryl Halides |
| 3     | 522.71                          | C-Br Stretching                       | Alkyl & Aryl Halides |
| 4     | 572.86                          | C-Br Stretching                       | Alkyl & Aryl Halides |
| 5     | 771.53                          | C-ClStretching                        | Alkyl & Aryl Halides |
| 6     | 862.18                          | C-HBending                            | Aromatics            |
| 7     | 927.76                          | C =C bending                          | Alkene               |
| 8     | 1024.20                         | None                                  | None                 |
| 9     | 1161.15                         | C –O stretching                       | Tertiary alcohol     |
| 10    | 1246.02                         | C-N stretching                        | Amine                |

|    |         |                 |                 |
|----|---------|-----------------|-----------------|
| 11 | 1373.32 | N-O stretching  | Nitro compounds |
| 12 | 1514.12 | O-N-OStretching | Nitro compounds |
| 13 | 2360.87 | None            | None            |
| 14 | 2929.87 | O-HStretching   | Carboxylic acid |

**5. Discussion**

In FT-IR spectra analysis, this sample *Vatha Siletpana Sura Kudineer* exhibits the peak value at 2929.87, 2360.87, 1514.12, 1373.32, 1246.02, 1161.15, 1024.20, 927.76, 862.18, 771.53, 572.86, 522.71, 437.84, 412.77 having O-H stretch, none, O-N-O stretch, N-O stretch, C-N stretch, C-O stretch, None, C=C Bend, C-Cl stretch, C-Br stretch, C-I

stretch respectively. This peak indicates the presence of some organic functional groups such as, Carboxylic acid, Isothianate, nitro compounds, amine, tertiary alcohol, alkenes, alkyl halides & aryl halides.

These compounds have some pharmaceutical properties and are briefly discussed below.

Nitro compounds has anti inflammatory [5, 6, 10], analgesic [7, 8, 10] antioxidant [9], anti proliferative [9], antipyretic [10]. it can act against infectious diseases [21], it has anti tubular activity [22] and anti parasitic activity [23]

Carboxylic acid acts as Anti inflammatory [11, 12], Analgesic [12], Anti pyretic and cytotoxic [12], Anti oxidant [13], It depresses cough and its symptoms [14].

Amines has anti inflammatory [15], antioxidant [15], Anti tussive [16], Bronchodialator [17] activities.

Alkl and Aryl halides has anti inflammatory [18, 20], Anti microbial [18], Anti niociceptive [20] activities.

Alcohols has analgesic activity [19]

## 6. Conclusion

The instrumental analysis FTIR shows the presence of functional groups through their stretch and bends which are responsible for its functional activity. According to the presence of functional group, it can be said that they have anti inflammatory, analgesic, antioxidant, anti pyretic, bronchodialator, anti nociceptive, anti tussive activities which has been mentioned in Siddha text books as indication for disease. It will be subjected to further many studies to validate its efficacy and safety through proper standardization procedure. Thus this drug can be taken to the next level of isolation of the active principles which is responsible for the therapeutic effect.

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