

FT-IR Analysis of Siddha Formulation “Shanmuga Navaneetha Chendhooram”

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Abstract: Background: The Shanmuga Navaneetha Chendhooram is a poly mineral siddha formulation used for the treatment of Paarisavaatham (Hemiplegia), Chachuvaayu, Thanurvaatham, Jikkuvavaatham. Objective: The objective of the present study is to characterize and assess the functional groups in polymineral drug “ShanmugaNavaneethaChendhooram”. Materials and methods: The ingredients were collected and purified and the drug was prepared as per Siddha literature “KannusamyParamparaiVaithiyam” by Kannusamy Pillai, page no: 353. Here, the drug was subjected into characterization through FT-IR analysis. Result: FT-IR characterization shows that the presence of functional groups like C-X Stretch (Bromide iodide), C-Cl Stretch (Aliphatic chloro compounds), CO-O-CO Stretch (Anhydride), O-H bending (Carboxylic acid), C=C Stretch (Alkene), O=C=O Stretch (Carbon-di-oxide), O-H Stretch (Alcohol), which ensure the efficacy and therapeutic effect of the drug. Conclusion: This study forms the base for the pharmaceutical analysis of Shanmuga Navaneetha Chendhooram which will be followed by access the functional group.

Keywords: FT-IR, Shanmuga Navaneetha Chendhooram, Functional groups, Paarisavaatham, Hemiplegia

1. Introduction

Siddha system is one of the ancient systems of medicine in India was introduced by the ancient scientists who were called as Siddhars. Traditional Siddha system of medicine growing worldwide because of its natural inheritance, effective treatment, healthy lifestyle and uniqueness in the holistic approach. Siddhars, the founders of Siddha medicine had designed the health practices including seasonal discipline and food regulation. The characteristic unique features of Siddha Pharmacology (Siddha Materia Medica) are exploitation of metal, mineral and animal product based preparations to a greater extent in comparison with other traditional systems of medicine.

According to the Siddha system for treating diseases drugs are mainly categorized into two classes based on the mode of administration, which are 32 types of *Aga marunthugal* (Internal medicine) and 32 types of *Puramarunthugal* (External medicine) described in Siddha texts. *Chendhooram* comes under the category of internal medicines. *Chendhooram* also known as *Kuruthipodi*. It has been noted that metallic or mineral medicines can help tremendously in patients with chronic or degenerative diseases. *ShanmugaNavaneethaChendhooram* is a poly mineral drug has been mentioned in the Siddha texts for the management of *Paarisavaatham* (Hemiplegia), *Chachuvaayu*, *Thanurvaatham*, *Jikkuvavaatham*. In Modern system of medicine the symptoms of Paarisavaatham may be correlated with “Hemiplegia”.

The standardization of the drugs will assess the quality control of the drugs. Standardization is a system that ensures a predefined amount of quality, quantity 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 poly mineral drug. The spectroscopic standardization to help the reducing the adulteration and definitely helps to understand the characterization of selected ingredients. Modern parameters are very useful to find out the drug adulteration and misidentification. The unidentified chemical compounds, physiochemical compounds were producing hazards to human health. So, Indian system of medicine is needed for standardization.

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 an analytical technique used to identify mainly organic materials. FT-IR analysis results in absorption spectra which provide information about the chemical bonds and molecular structure of a material. FT-IR spectrum analysis is very helpful to identify the presence of functional groups. In this article the drug SNC is subjected to access the functional groups present in the drug, with the help of FT-IR instrument.

2. Material and Method

Collection of Raw Drugs:

Raw drugs was purchased from Nagerkovil Gobalanasan Siddha Ayurvedic Medicals.

Authentication of Raw Drugs:

The identification of poly mineral raw drugs were authenticated by faculties of PG Gunapadam Department, Government Siddha Medical College, Palayamkottai.

Process of Preparation:

The ingredients given in the table 1 were purified as per the procedures given in the Siddha literature *Gunapadam – ThathuJeevaVaguppu* (Part 2&3).

Table 1: Ingredients of ShanmugaNavaneetha Chendhooram

| S. No | Tamil Name | English Name | Chemical Name | Quantity |
|-------|-------------------------|-------------------|---------------------------------|-----------|
| 1 | <i>Lingam</i> | Cinnabar | Red Sulphide of mercury-Natural | 1 Palam |
| 2. | <i>Rasa chendhooram</i> | Mercuric sulphide | Red Sulphide of mercury | 1/2Palam |
| 3. | <i>Rasa karpooram</i> | Calomel | Hydragyrumsubchloride | 1/4Palam |
| 4. | <i>Thalagam</i> | Orpiment | Yellow arsenic trisulphide | 1/4Palam |
| 5. | <i>Veeram</i> | Mercuric chloride | Hydragyrumperchloride | 1/16Palam |
| 6. | <i>Gandhagam</i> | Sulphur | Sulphur | 1 ½Palam |

Method of Preparation:

The polymineral drug (ShanmugaNavaneethaChendhooram) was prepared as per Siddha literature “*Kannusamy Paramparai Vaithiyam*” by *Kannusamypillai*, page no: 353

Shelf Life:

75 years.

Dosage:

Thuvaramparupualavu (Yellow lentil) (0.202 gm = 202 mg)

Adjuvant:

Drumstick tree bark juice with honey.

Indication:

- *Paarisavaatham* (Hemiplegia)
- *Chachuvaayu*
- *Thanurvaatham*
- *Jikkuvavaatham*

Instrumental Analysis:**Fourier transform – infrared (FT-IR)**

Fourier Transform Infra-Red Spectroscopy (FTIR) analysis results in absorption spectra that provide information about the functional group and molecular structure of a material IR relates with the sample and the bonds among atoms in the molecule stretch and bend, absorbing infrared energy and creating the infrared spectrum. It is of two kinds of bending and stretching. FT-IR is a very useful tool in the recognition of the functional groups of bio molecules, thus aiding in their structural elucidation, so confirming the presence of active molecules responsible for the therapeutic activity of *Siddha* drugs.

The FT-IR spectra of Shanmuga Navaneetha Chendhooram in Potassium Bromide (KBr) matrix recorded with scan rate of 20 spectra per second at the resolution 0.25 cm⁻¹ in the wave number region 400-4000cm⁻¹. The samples were ground to fine powder using agate mortar and pestle and then mixed with KBr. They were pelletized by applying pressure to prepare the specimen (the size of specimen about 13mm diameter and 0.3mm in thickness) to record the FT-IR spectra under standard conditions. FT-IR spectra were used to determine the presence of the functional groups and inorganic compounds of Shanmuga Navaneetha Chendhooram. The recorded spectrum shows in figure 1.



Figure 1: FTIR Instrument

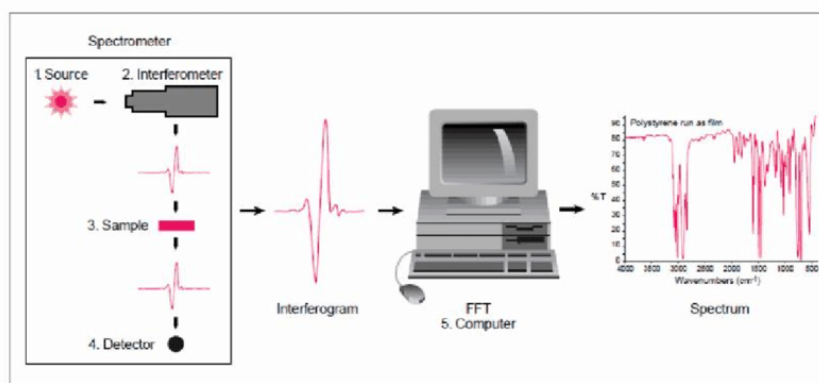


Figure 2: FTIR Mechanism

3. Results and Discussion

FTIR instrumental analysis was done at International Research Centre, Kalasalingam Academy of Research and Education, Krishnankoil, Viruthunagar district. The test drug was identified to have 7 peaks. They were the functional groups present in the *Shanmuga Navaneetha Chendooram*. The Table 2 and Figure 3 shows the presence of Bromide iodide, Aliphatic chloro compounds, Anhydride, Carboxylic

acid, Alkene, Carbon-di-oxide and Alcohol which represents the peak values. The FTIR analysis of SNC shows the spectrum that appears which denotes the molecular absorption and transmission. It forms the molecular fingerprint of the sample. It is the functional group and determines the amount of compounds present in the sample. These functional groups are responsible for the therapeutic effect of the drug.

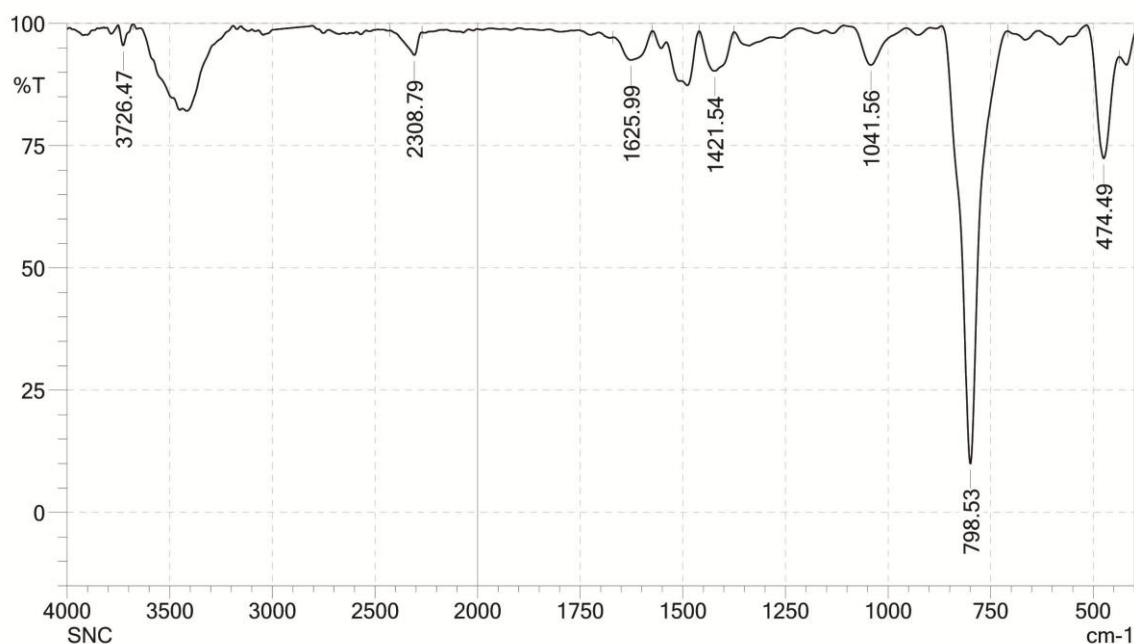


Figure 3: FTIR Spectra of SNC

Table 2: FTIR Interpretation of SNC

| S. No | Wave Number (cm ⁻¹) | Vibrational Modes of Sample (SNC) in IR region | Functional groups |
|-------|---------------------------------|--|----------------------------|
| 1 | 474.49 | C-X Stretching | Bromide iodide |
| 2 | 798.53 | C-Cl Stretching | Aliphatic Chloro Compounds |
| 3 | 1041.56 | CO-O-CO Stretching | Anhydride |
| 4 | 1421.54 | O-H bending | Carboxylic acid |
| 5 | 1625.99 | C=C Stretching | Alkene |
| 6 | 2308.79 | O=C=O Stretching | Carbon-di-oxide |
| 7 | 3726.47 | O-H Stretching | Alcohol |

These compounds have some pharmaceutical properties and briefly discussed below.

- **Alcohol**-Alcohol is a vasodilator-it makes the peripheral blood vessels relax to allow more blood to flow through the skin and tissues, which results in a drop in blood pressure. In order to maintain sufficient blood flow to the organs, the heart rate increases. Alcohol is an antiseptic, disinfectant, and antidote. Alcohol reduces the number of platelets in the blood, in part by interfering with blood cell production in the bone marrow. It makes the platelets less sticky.
- **Bromide iodide**-Acute sedative and anticonvulsant effects, chronic bromide ingestion produces a number of neuropsychiatric changes.

- **Carbon dioxide** – Antioxidant.
- **Anhydride** – Anti – inflammatory, Anesthetic, Antifungal, Anti epileptic.
- **Carboxylic acid** – Analgesic, Anti pyretic, Anti inflammatory, but is mainly used as 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.
- **Alkene**-This is used as general anaesthetic and have anti-oxidant activity. This is also used to prepare some organic compounds such as ethyl alcohol, acetic acid and acetaldehyde.

June); 493 – 497, Available from: [http:// www.jtim.biosci.in](http://www.jtim.biosci.in).

4. Conclusion

The instrumental analysis FT-IR shows the presence of functional groups through their stretch and bends which are responsible for its functional activity. 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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References

- [1] Kannusamy pillai. S, Kannusamy paramparaivaithiyam, B. RathnaNayakar & Sons, Chennai 600079.
- [2] Dr. Thiyagarajan. R, 2009, Gunapadam – ThathuJeevaVaguppu part 2&3, Department of Indian Medicine and Homeopathy, Chennai 600106.
- [3] Sambasivampillai T. V, Siddha Medical Dictionary (Tamil-English) Volume II – Part I, Department of Indian Medicine and Homeopathy, Chennai 600106.
- [4] SingarajahJanani, Antony duraichi. R, FTIR Characterization analysis of the Siddha Formulation KadikkaraChendhooram, Journal of Traditional and integrative medicine, Vol 4, Issue 2, 2021 (Apr-Jun); 478-481, Available from: [http:// www.jtim.biosci.in](http://www.jtim.biosci.in).
- [5] Fourier Transform Infra-red Spectroscopy available at: https://www.lpdlabsservices.co.uk/analytical_techniques/chemical_analysis/ftir.php
- [6] Fourier Transform Infrared Spectroscopy (FT-IR), Analysis and testing Chemical Compound, Available from: <http://www.intertek.com/analysis/ftir>.
- [7] Shakthipriya. M, Essakkyandian. G, Assessment of Functional group in herbo mineral formulation ThirikadugadhiMandooram through fourier transform infrared spectroscopy, Journal of traditional and Integrative medicine, Vol 4, Issue 2, 2021 (Apr –