



**FOURIER TRANSFORM INFRARED SPECTROSCOPY ANALYSIS OF SIDDHA
HERBAL DRUG MUSUMUSKKAI KUDINEER**

Jeevitha P.^{1*}, Manoharan A.² and Subash Chandran G.³

*PG Scholars, Department of Pothu Maruthuvam, Government Siddha Medical College and Hospital, Palayamkottai, Tirunelveli, Tamilnadu, India.

¹Professor & HOD, Department of Pothu Maruthuvam, Government Siddha Medical College and Hospital, Palayamkottai, Tirunelveli, Tamilnadu, India.

²Reader, Department of Pothu Maruthuvam, Government Siddha Medical College and Hospital, Palayamkottai, Tirunelveli, Tamilnadu, India.

*Corresponding Author: Jeevitha P.

PG Scholars, Department of Pothu Maruthuvam, Government Siddha Medical College and Hospital, Palayamkottai, Tirunelveli, Tamilnadu, India.

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ABSTRACT

Background: The Siddha system is the holistic and unique medical system based on principles for providing preventive, promotive, curative, rehabilitative, rejuvenative health needs. Herbals are mostly used in siddha medicines because of its high therapeutic potential. The Musumuskkai Kudineer is a herbal drug used for the treatment of Pitha Paandu (Iron Deficiency Anaemia). **Aim:** The main objective of the study was to standardize the siddha herbal drug Musumuskkai Kudineer by using FTIR analysis. FTIR study revealed the different characteristic peak values with various functional compounds present in the extract of the drug. **Materials and Methods:** The ingredients of Musumuskkai Kudineer were collected and purified the drug was prepared as per siddha literature Yugimuni Vaithiya Kaaviyam. Results: The FTIR characterization showed the presence of some functional groups such as N-H stretching (Aliphatic primary amine), -CH₂- (Alkanes), C-H stretching (Alkanes), P-H Phosphine (Misc.), NH out of plane (Amides), CH₂ and CH₃(Alkanes), C-O stretching (Aliphatic ether), S=O stretching (Sulfoxide), C-H bend (alkynes), C-Br stretching (Alkyl Halides) which ensure the efficacy and therapeutic effect of the drug. **Conclusion:** The FTIR study for Musumuskkai Kudineer shows the presence of functional groups through the stretch and bends which responsible for its functional activity.

KEYWORDS: FTIR, Musumuskkai Kudineer, Standardization, Siddha.

1. INTRODUCTION

Siddha a traditional healing science of India is an age-old holistic medicine which emphasizes the maintenance of relaxed mind and body harmony and insists to keep pace with the laws of nature.^[1] The Musumuskkai Kudineer is a herbal drug has been mentioned in the siddha text for the management of Pitha Paandu (iron deficiency anaemia).^[2] The standardization of the drug is a key factor in assessing the quality control of the drugs to establish the medicine in a valuable mode.^[3] The spectroscopic standardization to help the reducing the adulteration and definitely helps to understand the characterization of selected ingredients. The Indian system of medicine is needed for standardization. For the

development of a new drug or the standardization of the traditional siddha formulation through characterization, usage of modern sophisticated equipment's is an emergency need to strengthen the field of pharmacology.^[4] FTIR spectroscopic technique is used to identify the functional groups of the chemical constituents, but it has been widely used for the identification, quality control and manufacturing process supervision of herbal medicines in recent years. The efficacy of the herbal medicines depends on the amount of the active components present in the drug.^[5] In this article the drug Musumuskkai Kudineer is subjected to access the functional groups present in the drug, with the help of FTIR instrument.

2. MATERIALS AND METHODS

Table 1: Ingredient of Musumuskkai Kudineer.^[6]

S. No	Tamil name	Scientific name	Family	Part used
1.	Musumuskkai	<i>Mukia maderaspatana</i> Linn	Cucurbitaceae	Whole plant
2.	Kizhanelli	<i>Phyllanthus amarus</i> Linn	Euphorbiaceae	Whole plant

Collection of raw drugs

Required drugs was purchased from from the herbal drug shop, Thackkalay, Kanyakumari district, Tamilnadu, India.

Authentication

The drugs were identified and authenticated by Gunapadam experts at Government Siddha Medical College and Hospital, Palayamkottai – 627002.

Purification and preparation of the drug

The adulterant dust and other materials are removed. The drug is purified, dried and grinded into kudineer chooranam .10 gm of kudineer chooranam is added with 400 ml of water and boiled until it reduced until ¼ of its of its quantity and make kashayam to dispense.

Fourier Transform Infrared Spectroscopy Analysis

FTIR (Fourier Transform Infrared Spectroscopy) is a sensitive technique particularly for identifying organic chemicals in whole range of application although it can also characterize some inorganic. Examples include paints, adhesives, resins, polymers, coatings and drugs. FTIR is an effective analytical instrument for detecting functional groups.^[7]

The FTIR spectra of Musumuskkai Kudineer 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 specimen about 13mm diameter and 0.3mm in thickness) to record the FTIR spectra under standard conditions. FTIR spectra were used to determine the presence of the functional groups and inorganic compounds of Musumuskkai Kudineer.

3. RESULTS AND DISCUSSION

FTIR spectra were recorded at Musumuskkai Kudineer siddha regional research institute, Poojappura, Thiruvananthapuram, Kerala. Instrument model=FT-WN was used to derive the FTIR spectra of Musumuskkai Kudineer. The test drug was identified to have 10 peaks. They represent functional groups presents in the Musumuskkai Kudineer. The FTIR analysis of Musumuskkai Kudineer 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 determine the amount of compound present in the sample. The functional groups are responsible for the therapeutic effect of the drug.^[8]

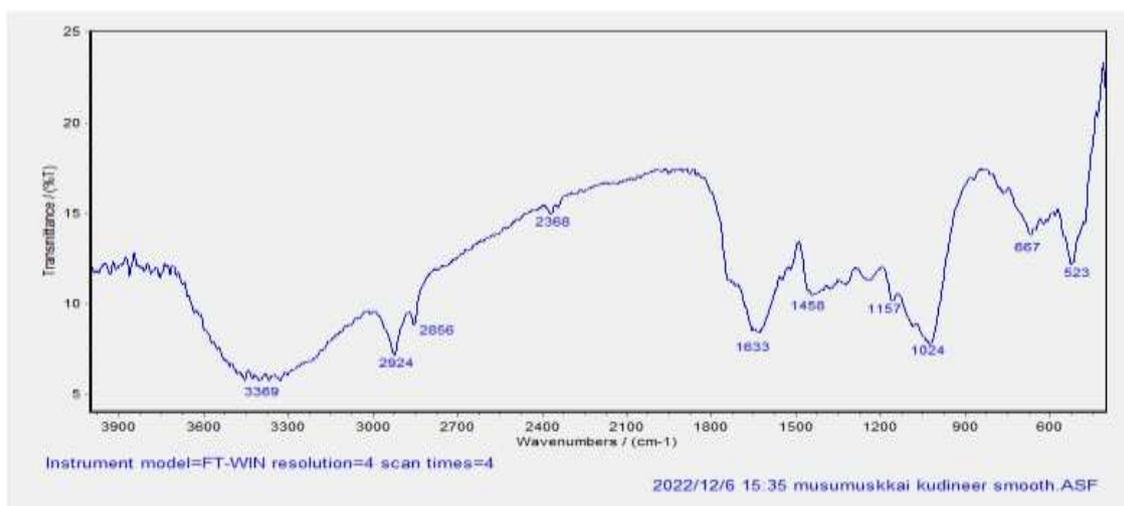


Figure 1: FTIR spectra of Musumuskkai Kudineer.

Table 2: Functional groups for peak values.^[9]

S.no	Peak	Characteristic absorptions (cm-1)	Possible functional group	Class
1.	3369	3300-3600	N-H stretching	Aliphatic primary amine
2.	2924	2700-3000	-CH ₂ -	Alkanes
3.	2856	2700-3000	C-H stretching	Alkanes
4.	2368	2100- 2400	P-H phosphine	Misc
5.	1633	1500-1800	NH out of plane	Amides
6.	1458	1200-1500	CH ₂ and CH ₃	Alkanes
7.	1157	900-1200	C-O stretching	Aliphatic ether
8.	1024	900-1200	S=O stretching	Sulfoxide
9.	667	600-900	C-H Bend	Alkynes
10.	523	300-600	C-Br stretch	Alkyl halides

In the FTIR spectroscopic analysis, the trial drug Musumuskai Kudineer exhibits the peak value which shows in table 2. The wave number of 3369, 2924, 2856, 2368, 1633, 1458, 1157, 1024, 667, 523 having N-H stretching, -CH₂-, C-H stretching, P-H phosphine, NH out of plane, CH₂ and CH₃, C-O stretching, S=O stretching, C-H Bend, C-Br stretch. This indicates the presence of functional compounds aliphatic primary amine, alkanes, misc, amides, aliphatic ether, sulfoxide, alkynes, alkyl halides. 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.

Aliphatic primary amines

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.^[10]

Amides

Their importance lies in their biological activities like antitumor, anthelmintic, antispasmodic, antifungal, antibacterial, insecticidal, and herbicidal activities.^[11]

Alkanes

They have (2,3&4 alkyl groups bonded to the carbon atoms of double bond are disubstituted, trisubstituted, tetrasubstituted) exhibit high antimicrobial activity, immunomodulator and antioxidant activity.^[12]

Alkyne

It is a biological and chemical functional moiety found in numerous natural products. Alkyne derivatives have anti-fungal activity. They play an important role in pharmaceutical industry.

Alkyl Halides

Alkyl halides have little biological activity. They protect against bacteria and fungi.^[13]

4. COCLUSION

FTIR Spectroscopy is an important investigatory tool in the field of pharmaceutical science for the structural elucidation. It concluded that presence of functional group of Musumuskai Kudineer have Antioxidant, Anthelmintic and Antimicrobial activity. This will ensure the quality, efficacy and therapeutic effect of the Musumuskai Kudineer. These findings will give valuable information for future clinical trials.

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6. REFERENCES

1. Bakyalakshmi C, Kingsly A, FTIR Analysis of Siddha Medicine "Kara Sooda Sathu Parpam" International Journal of Science and Research, 2022; 11(3): 2319-7064.
2. Mohan R.C, Yugimuni Vaithiya Kaaviyam, Thamarai Noolagam Edition, 2002; 136.
3. Aparna T, Thiruthani M, Scientific Evaluation of Presence of Functional Groups in Siddha Medicine Gandhaka Parpam using FTIR Spectrometer, International Journal of Current Research in Biology and Medicine, 2018; 3(5): 54-56.
4. Mownika R, Manoharan A, Komalavalli T, Assessment of Functional Group in Perungaya Choornanam through Fourier Transform Infrared Spectroscopy, International Journal of Pharma Research and Health Sciences, 2022; 10(3): 3407-3409.
5. Samroothul Parveen I, Kayalvizhi S, Fourier Transform Infrared Spectroscopy analysis of herbal drug Maavilingapatti Kudineer, European Journal of Biomedical and Pharmaceutical Sciences, 2019; 6(7): 201-204.
6. Mohan R.C, Yugimuni Vaithiya Kaaviyam, Thamarai Noolagam Edition, 2002; 136.
7. Bose priyan S, Kingsly A, Fourier Transform Infrared Spectroscopy analysis of Siddha mineral drug Velvanga Parpam, Journal of Traditional and Integrative Medicine, 2021; 4(2): 515-518.
8. Mullaikodi P, Manoharan A, Evaluation of Functional Group in Herbal Formulation Maavilingapattai Kudiner through Fourier Transform Infrared Spectroscopy study, 2022; 9(6): 72-77.
9. IR Spectrum Table & Chart. <https://www.sigmaaldrich.com>
10. Thangam T, Essakipandian G, Fourier Transform Infrared Spectroscopy analysis of Siddha Formulation "Ayakaruppu", International Journal of Science and Research, 2022; 11(3): 2319-7064.
11. Vishal Kumar, Vinod Bhatt, Neeraj Kumar, Amides from plants: Structures and Biological Importance, Science Direct, 2018; 56: 287-333. <https://www.sciencedirect.com>
12. Vinothine R, Antonyduraichi R, Assessment of Functional Group Herbal formulation *Thalisapaththiri Choornam* through Fourier Transform Infrared Spectroscopy, International Journal of Science and Research, 2022; 11(3): 2319-7064.
13. Alexander S, Kamaraj D, Sundararajan, Assessment of Functional Group Herbal formulation *Thathuviruthi Kuligai* through Fourier Transform Infrared Spectroscopy, International Journal of Recent Advances in Multidisciplinary Topics, 2022; 3(5): 2582-7839.