

Original article

Assessment of Functional Group in Perungaya Chooranam through Fourier Transform Infrared Spectroscopy

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ABSTRACT:

Background: The Importance of traditional medicinal plants are increasing day by day due to presence of numerous bioactive chemicals in their extracts. The Perungaya Chooranam (PC) is a herbal drug used for the treatment of Vatha gunmam (Peptic ulcer disease).

Aim and Objective: This study is aimed at evaluating the morphology and elemental characterization of the Perungaya Chooranam.

Materials and methods: The ingredients of PC were collected and purified, the drug was prepared as per Siddha literature Gunapadam (First Edition Mooligai Vaguppu). FT-IR analysis is used for evaluation for this study.

Results: The FT-IR characterization showed, that 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-H Stretching (Amine salt), C-Br Stretching (Halo compound), C-F Stretching (Fluoro compound), C-O Stretching (Aromatic ester), C-N Stretching (Aromatic Amine), and N-O Stretching (Nitro compound) which ensures the therapeutic effect of the drug. Conclusion: The FT-IR study for Perungaya chooranam showed the presence of various functional groups through the stretch and bends which is responsible for its functional activity. The functional groups present in the PC have potential analgesic, anti-ulcer, anti-spasmodic and anti-inflammatory activities. This will be ensured the efficacy and therapeutic effect of the drug Perungaya Chooranam.

Keywords: FT-IR, Perungaya Chooranam, functional groups, Herbal siddha formulation.

1. INTRODUCTION

The *Siddha* system is one of the ancient systems of medicine in India which 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 life style and uniqueness in the holistic approach. *Siddhars* is 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 herbal product based preparations to a greater extent in comparison with other traditional systems of medicine [1, 2]. *Perungaya chooranam* is a herbal drug has been mentioned in the *Siddha* texts for the management of *Peptic ulcer disease vatha gunmam*).

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 a herbal drug [3, 4]. 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* 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. This article the drug PC is to determined the various functional groups in the drug [5].

2. MATERIALS AND METHODS

Collection, Authentication and preparation of raw material:

The raw drug was purchased from ASN herbal shop, Melapalayam, Tirunelveli District. The drug was identified and authenticated by the Medicinal Botanist at Government Siddha Medical College and Hospital, Palayamkottai. The ingredients of the trial drug were purified according to the proper procedure methods described in Siddha classical literature [6, 7].

Table 1: Ingredients of PERUNGAYA CHOORANAM

S.NO	TAMIL NAME (HERB)	BOTANICAL NAME	FAMILY	PARTS USED
1.	PERUNGAYAM	<i>Ferula asafoetida</i>	<i>Apiaceae</i>	Resin
2.	TULSI	<i>Ocimum sanctum</i>	<i>Lamiaceae</i>	Leaves

Method of Preparation:

Purified raw drugs were made into fine powder separately and mixed together homogenously. Then it is filtered using pure white cloth. The adulterants were removed and dried in the shade and then the prepared drug was kept in an air tight container [8].

Dosage: 6.3g/ Twice a day (Orally)

Adjuvant: Hot water

Instrumental analysis:

FTIR 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 Perungaya Chooranam [9].

Fourier transform – infrared (FT-IR)

As per figure No.1, 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 Perungaya chooranam 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 Perungaya chooranam .



Fig 1: FTIR Instrument

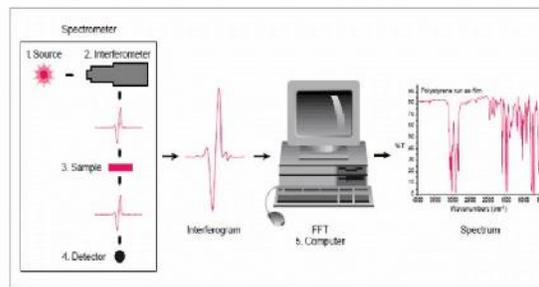


Fig 2: FTIR Mechanism

3. RESULTS AND DISCUSSION

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 PC (fig.No.1). The test drug was identified to have 6 peaks. They were the functional groups present in the *perungaya chooranam*. The FTIR analysis of perungaya 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 compounds present in the sample. These functional groups are responsible for the therapeutic effect of the drug [8, 9].

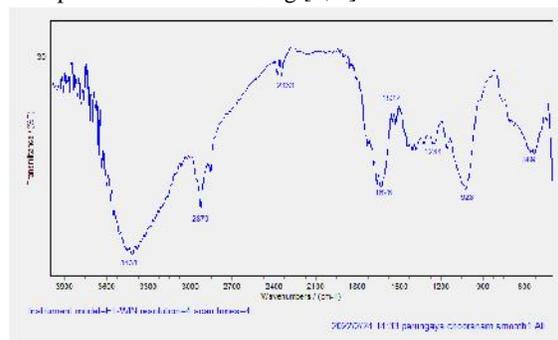


Fig 3: FTIR Spectroscopic analysis

Table 1: Interpretation of PC

S.No	Wave Number(cm ⁻¹)	Vibrational Modes of Perungaya Chooranam in IR region	Functional groups
1	3438	O-H Stretching	Alcohol.
2	2870	O-H Stretching ,N-H Stretching	Carboxylic acid, aminesalt.
3	1626	C=C Stretching, N-H	Conjugated alkene.

		Bending	Amine, Cyclic alkene.
4	1522	N-O Stretching	Nitro compound.
5	1284	C-N Stretching, C-O Stretching, C-F Stretching	Aromatic compound, aromatic ester, fluoro compound
6	569	C-Br Stretching	Halo compound.

According to (Table No.1) the perungaya Chooranam, is known to have Alcohol, Carboxylic acid, Conjugated alkene, Amine, Cyclic alkene, Nitrocompound, Aromatic compound, Aromatic ester, Fluoro compound, and Halo compound. These compounds have some pharmaceutical properties and are responsible for the therapeutic action of the drug. These compounds have some pharmaceutical Values and briefly discussed.

4. CONCLUSION

The sample PC is known to 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), N-H Stretching (Amine Salt) C-F Stretching (Fluoro compound), C-N Stretching (Amine), C-O Stretching (Aromatic ester), C-N Stretching (Aromatic amine), and C-Br Stretching (Halo compound).The functional groups in the sample PC have analgesic, anti-inflammatory, anti-ulcer and anti-spasmodic activities. This will ensure the efficacy and therapeutic effect of Perungaya Chooranam to treat APD, It was safety and efficacy to prolonged usages.

5. REFERENCES

1. Uthamaroyan CS. Siddha, Pharmacopoeia of Hospital of Indian Medicine, Tamilnadu Siddha Medical Board, Madras-600 106:1995.
2. Fourier Transform Infra-red Spectroscopy available at: https://www.lpdlabservices.co.uk/analytical_techniques/chemical_analysis/ftir.php (Accessed December 18, 2021).
3. Fourier Transform Infrared Spectroscopy (FT-IR), Analysis and testing Chemical. https://www.mt.com/in/en/home/products/L1_AutochemProducts/ReactIR/ftir-spectroscopy.html (Accessed January 16, 2022).
4. https://www.mt.com/in/en/home/products/L1_AutochemProducts/ReactIR/ftir-spectroscopy.html (Accessed February 09, 2022).
5. IR Spectrum Table & Chart. <https://www.sigmaaldrich.com> (Accessed February 24, 2022).
6. Kannusampillai S, Kannusamy paramparaivaithiyam, B. Rathna. Tribes of Tamilnanu. Nayakar & Sons, Chennai, 2011; pp. 324-56.
7. Sambasivampillai TV. Siddha Medical Dictionary (Tamil-English) Volume II – Part I, Department of Indian Medicine and Homeopathy, Chennai 600106.

8. Thiru K S. Murugesu Mudhaliyar, Gunapadam Mooligai Vaguppu (Part-1), Department of Indian Medicine and Homeopathy, Chennai-106:2013.
9. Thompson T. Analgesic Effects of Alcohol: A Systematic Review and Meta-Analysis of Controlled Experimental Studies in Healthy Participants. J Pain 2017; 18: 499-510.

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