



**SCIENTIFIC EVALUATION OF PRESENCE OF FUNCTIONAL GROUPS IN SIDDHA
MEDICINE THAZHUTHALAI ILAI CHOORANAM THROUGH FOURIER
TRANSFORM INFRARED SPECTROSCOPIC STUDY**

M. Manibharathi*¹ and A. Manoharan²

PG Scholar*¹, Professor and HOD²

Department of Pothu Maruthuvam, Government Siddha Medical College, Palayamkottai- 627002, Tirunelveli,
Tamilnadu, India.

*Corresponding Author: M. Manibharathi

PG Scholar Department of Pothu Maruthuvam, Government Siddha Medical College, Palayamkottai- 627002, Tirunelveli, Tamilnadu, India.

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ABSTRACT

Background: The Siddha system of medicine is the most primitive medical system. The philosophy of siddha medicine is based on these principles of vadhnam, Pitham, Kabam. Siddha medicine not only cures the diseases but also explain the method of preventing the diseases. Kumbavadham is one of the vadhna diseases(Periarthritis). Thazhuthalai ilai chooranam is a mono-herbal drug indicated for kumbavadham, mentioned in a classical siddha literature Gunapadam mooligai vaguppu. **Aim:** The aim of the study to assess the morphology and elemental characterization of thazhuthalai ilai chooranam. The functional groups of drug formulation are analysed through FT-IR Spectroscopy and pharmacological roles of functional groups are discussed in this study. **Materials and Methods:** The raw drugs are collected and purified then ground into micronized powder. The drug was subjected into characterization through FT-IR analysis. **Results:** The FT-IR analysis showed the presence of functional groups that are O-H Stretching(carboxylic acid, alcohol), O-H bending (carboxylic acid ,alcohol), N-H Stretching(Amine salt), N-H Bending(Amine), C=C Stretching (Alkene, conjugated alkene, cyclic alkene), S=O Stretching(sulphate), C=N Stretching(Amine), C-O Stretching (Aliphatic ether, secondary alcohol), C-Br Stretching(Halo compound). C=C Bending (Alkene), C-I Stretching (Halo compound) which are ensures the therapeutic efficacy of drug. **Conclusion:** The analysis of FT-IR Study for Thazhuthalai ilai chooranam showed the presence of functional group through the stretching and bends which is responsible for biological activity. The Pharmacological effects of Thazhuthalai ilai chooranam is due to Carboxylic acid, Alkene, Halocompound, Amine, Amine salt, Sulphate. This will assure the efficacy and therapeutic effect of the drug. This FT-IR Study will be very useful for the further study of Thazhuthalai ilai chooranam.

KEYWORDS: FT-IR, Thazhuthalai ilai chooranam, Siddha medicine, Functional groups, Kumbavadham, Periarthritis.

INTRODUCTION

The Siddha medicine is traditional system of healing that originated in South india. The Siddha system is based on a combination of ancient medical practices and spiritual disciplines as well as alchemy and nature. Approximately 1.7 billion people have musculoskeletal Diseases in worldwide. Periarthritis shoulder is one of the musculoskeletal disorder that affect the shoulder joint and around tissues. In siddha, periarthritis correlated with kumbavadham. Thazhuthalai ilai chooranam preparation is mentioned in Siddha materia medica (Gunapadam mooligai vaguppu) for indicate of periarthritis. FTIR characterization was done for Thazhuthalai ilai chooranam to evaluate the functional group identification. FTIR analysis used infrared light to scan test samples.

The FTIR spectroscopy is a rapid, economical, easy and non-destructive technique.^[1] FTIR is extremely useful technique for confirming the identify the pure compounds but has limited value if used for mixtures of compounds. The technique is based upon the identification of functional groups within molecules where such groups vibrate (either through stretching or bending in various ways) when irradiated with specific wavelength of light. These vibrations and their intensity (%transmission) are plotted against the frequency of light (cm-1) to which the sample is exposed to produce an FTIR spectrum, portions of the FTIR spectrum are unique to the compound under test (this is called the Fingerprint region).^[2] FTIR spectroscopy is used to help scale up chemical reactions optimize reaction and minimize by product impurities. In this article, describe

about find out the functional group of thazhuthalai ilai chooranam using FTIR analysis.

MATERIALS METHODS

Trial drug selection

The Siddha formulation Thazhuthalai ilai chooranam mentioned in siddha literature Gunapadam Mooligai vaguppu author of vaithiya rathinam Dr. K.S.Murugesamudhaliar.

Process of drug preparation

Table 1: Thazhuthalai Ilai Chooranam.

S.NO	TAMIL NAME	SCIENTIFIC NAME	PARTS USED	QUANTITY
1	Thazhuthalai	Clerodendrum phlomidis (Linn)	Leaves	Q.S

Adulterants dust and other materials are removed. Then, The leaves was dried and ground into micronized powder. The drug was labelled as Thazhuthalai Ilai chooranam (TIC)

RESULTS AND DISCUSSION

FT-IR Analysis

FT-IR Spectra were recorded on Thzuthalai ilai chooranam at Siddha Regional Research Institute, Poojappura, Thiruvananthapuram, Kerala. Instrument model =FT=WIN was used to derive the FT-IR Spectra

Collection of Raw materials

Raw drug was collected from the herbal drug shop, Thackkalay, Kanyakumari district, Tamilnadu.

Authentification of Raw materials

The raw drug was identified and authenticated by medicinal botanist and Gunapadam experts at Govt. Siddha medical college, Palayamkottai, Tirunelveli.

of Thazhuthalai ilai chooranam. The test drig identified to have peaks. This reflects the functional groups present in Thazhuthalai ilai chooranam. The FTIR Analysis of Thazhuthalai ilai chooranam showed the spectrum that appears. This spectrum denotes the molecular absorption and transmission. It forms the molecular finger print of sample drug. It denote the functional group and amount of compound present in sample. The functional groups are responsible for therapeutic efficacy of the herbal drug Thazhuthalai ilai chooranam.

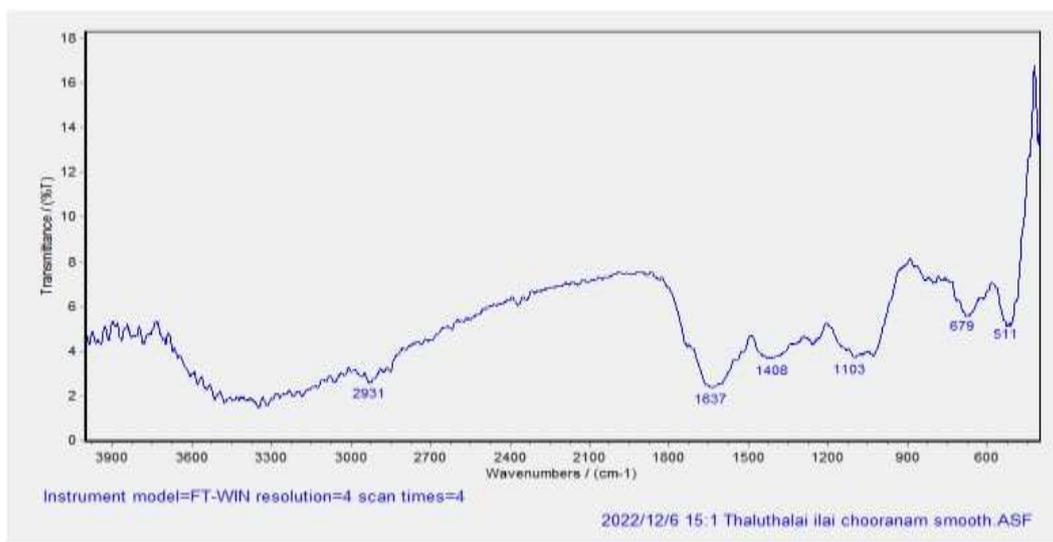


Table 2: Functional Groups for peak values.

S.NO	Wave Number (cm ⁻¹)	Vibrational Modes Of Thazhuthalai Ilai Chooranam In Ir Region	FUNCTIONAL GROUPS
1	2931	O-H Stretching N-H Stretching	Carboxylic acid, Alcohol Amine salt
2	1637	C=C Stretching N-H Bending	Alkene, Conjugated alkene, Cyclic alkene Amine
3	1408	O-H Bending S=O Stretching	Carboxylic acid, Alcohol Sulphate
4	1103	C=N Stretching C-O Stretching	Amine Aliphatic ether, Secondary alcohol
5	679	C-Br Stretching C=C Bending	Halo compound Alkene
6	511	C-I Stretching	Halo compound

From above FTIR Analysis, Thazhuthalai ilai chooranam contains Carboxylic acid, Alcohol, Amine salt, Alcohol, Alkene (Conjugated alkene, cyclic alkene), Amine, Sulphate, Aliphatic ether, Halo compound. These compounds have good pharmacological activities.

Carboxylic acid

A wide variety of endogenous substances such as aminoacids, triglycerides possess carboxylic moiety. This functional group is often part of the pharmacophore of diverse classes of therapeutic agents. Indeed, large number of carboxylic acid containing drugs used non-steroidal Anti-inflammatory drugs (NSAID's), Antibiotics, Anti-coagulants, Cholesterol lowering statins among worldwide.^[6] It has analgesic, Anti-pyretic activity.^[5]

Alcohol

Recent studies have demonstrated that alcohol leads to alteration in immune response including to Anti-microbial, Anti-viral. Alcohol have Anti-inflammatory activity in normal monocytes by attenuating pro-inflammatory cell activation.^[7]

Amine salts

The metal complexes and salts of amine carboxy borans were shown to be potent Anti-inflammatory activity in animal studies.

The Anti-inflammatory activity of these agents at the molecular levels appears to be due to inhibition of release of TNF alpha and IL-1 from macrophages which indirectly control chemotaxic migration of whole blood cells as indicated by the suppression of PMN and macrophage invasion into sponges implanted subcutaneously in mice.^[8]

Amine

A number of amine borans and related derivatives possess a wide range of biological activities including Anti-neoplastic, Anti-viral, Hypolipidemic, Anti-inflammatory activities, Anti-osteoporotic, Dopamine receptor antagonist activities.^[9]

Sulphate

Sulphate Reduce the increased serum enzymes in the liver and it has liver protection property. Chondroitin sulphate may reduce inflammatory processes by acting on the nuclear translocation of NF- Kb which is closely associated with the blood biomarkers of inflammation, primarily IL-1, IL-6 and C-reactive protein.^[10]

Alkene

Alkene compound have Anti-oxidant properties. Alkenyl phenyl propionic acids showed the most potent Anti-inflammatory activity in the carrageenan edema test in animal studies.^[11]

Halo compound

Some Halo –chalcones suppressed the expression of pro-inflammatory factors toll like receptors 4 (TLR 4), IKB-alpha, IL-1 Beta, IL -6, TNF-(Alpha), Cyclooxygenase 2(COX-2).^[12]

CONCLUSION

The spectroscopic analysis of Thazhuthalai ilai chooranam showed the presence of functional groups through the stretching and bends. Presence of these functional groups is assure the quality and therapeutic efficacy of the Thazhuthalai ilai chooranam. This information will be very useful for further research studies.

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