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## Assessment of functional group in herbal formulation Nochi ver kudineer Chooranam through Fourier Transform Infrared Spectroscopy.

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### Abstract

**Background:** The Nochi ver kudineer Chooranam is a single herbal drug formulation is used for the treatment of Thandagavatham (Lumbar spondylosis). **Objective:** This study is aimed at evaluating the morphology and elemental characterization of the Nochi ver kudineer Chooranam. **Materials and methods:** The ingredients were collected and purified and the drug was prepared as per Siddha literature Gunapadam (First Edition Mooligai Vaguppu). It is subjected into characterisation through FT-IR analysis. **Results:** The FT-IR characterization showed that the presence of functional groups like N-H Stretching (Secondary amine, Aliphatic primary amine), O-H Stretching (Alcohol), O-H Stretching (Carboxylic acid, Alcohol), C-H Stretching (Alkane), N- H Stretching (Amine salt), C=O Stretching (Esters, Delta Lactone), C-H bending (Aromatic Compound), C=C Stretching ( Alkene, Conjugated alkene, Cyclic alkene), N-H Bending (Amine), O-H Bending (Phenol), O-H Bending (Alcohol), C-F Stretching (Fluro compound), C-N Stretching (Amine, Aromatic amine), S=O stretching (Sulfone), S=O Stretching( Sulfoxide), C-H Bending (1,2,4-trisubstituted, 1,3-disubstituted), C-H Bending (1,2,3-trisubstituted, 1,2- disubstituted), C-Cl Stretching (Halo compound), C-I Stretching (Halo compound) which ensures the therapeutic effect of the drug. **Conclusion:** The FT-IR study for Nochi ver kudineer chooranam shows the presence of functional groups through the stretch and bends which is responsible for its functional activity. The functional groups present in the Nochi ver kudineer Chooranam have Analgesic, Anti-inflammatory, Anti oxidant activities. This will ensure the efficacy and therapeutic effect of the drug Nochi ver kudineer Chooranam. This study forms the base for the pharmaceutical analysis of the Nochi ver kudineer Chooranam.

**Keywords:** FT-IR, Nochi ver kudineer Chooranam, functional groups, siddha formulation, Lumbar spondylosis, Thandagavatham.

## Introduction

Siddha Science is a well defined Science which was originated in southern part of India. Siddha System of Medicine has a distinctive approach to care specific ailments and also to build up immunity power of the person being treated against all diseases. The major strength of this Siddha System is to easy accessibility, naturalness of the products and low cost effectiveness.

The Nochi ver kudineer Chooranam is taken from the classical Siddha literature Gunapadam (First part Mooligai Vaguppu). This is used to treat Thandagavatham (Lumbar spondylosis). The ingredient was the root of the tree Nochi-*Vitex negundo* (Linn).

Fourier Transform Infrared (FTIR) spectroscopy is an analytical methodology used in industry and academic laboratories to understand the structure of individual molecules and the composition of molecular FT-IR is one of the important analytical technique, which used to determine the organic compound. FT-IR spectroscopy uses modulated, mid-infrared energy to interrogate a sample. The infrared light is absorbed at specific frequencies directly related to the atom-to-atom vibrational bond energies in the molecule. When the bond energy of the vibration and the energy of mid-infrared light are equivalent, the bond can absorb that energy. Different bonds in a molecule vibrate at different energies, and therefore absorb different wavelengths of the IR radiation. The position (frequency) and intensity of these individual absorption bands contribute to the overall spectrum, creating a characteristic fingerprint of the molecule. In this article, Nochi ver kudineer Chooranam is subjected to access the functional groups present in the drug, with the help of FT-IR instrument.

## Materials and Methods

### Trial drug selection:

The details about the herbal drug formulation Nochi ver kudineer chooranam selected from Siddha literature Gunapadam pagam-I (Mooligai

vaguppu) author of Vaithiya Rathinam Dr K.S.Murugesu Mudhaliyar

### Collection of raw materials:

The raw drug was collected from the Thackkalay, Kanyakumari district, Tamilnadu.

### Authentication of raw materials:

The raw drug was identified and authenticated by the Medicinal Botanist and Gunapadam experts at Government Siddha Medical College and Hospital, Palayamkottai.

### Process of preparation:

The adulterants and dusts in the root were removed and dried in the shade. The roots were coarse powdered and then bottled up.

**Table 1: Ingredients of Nochi ver kudineer Chooranam.**

S.No	Tamil Name	Scientific name	Parts Used	Quantity
1.	Nochi ver	<i>Vitex negundo</i> (Linn).	Roots	Q.S

**Dosage:** 30ml/ Twice a day (Orally)

**Shelf life:** 3 hours

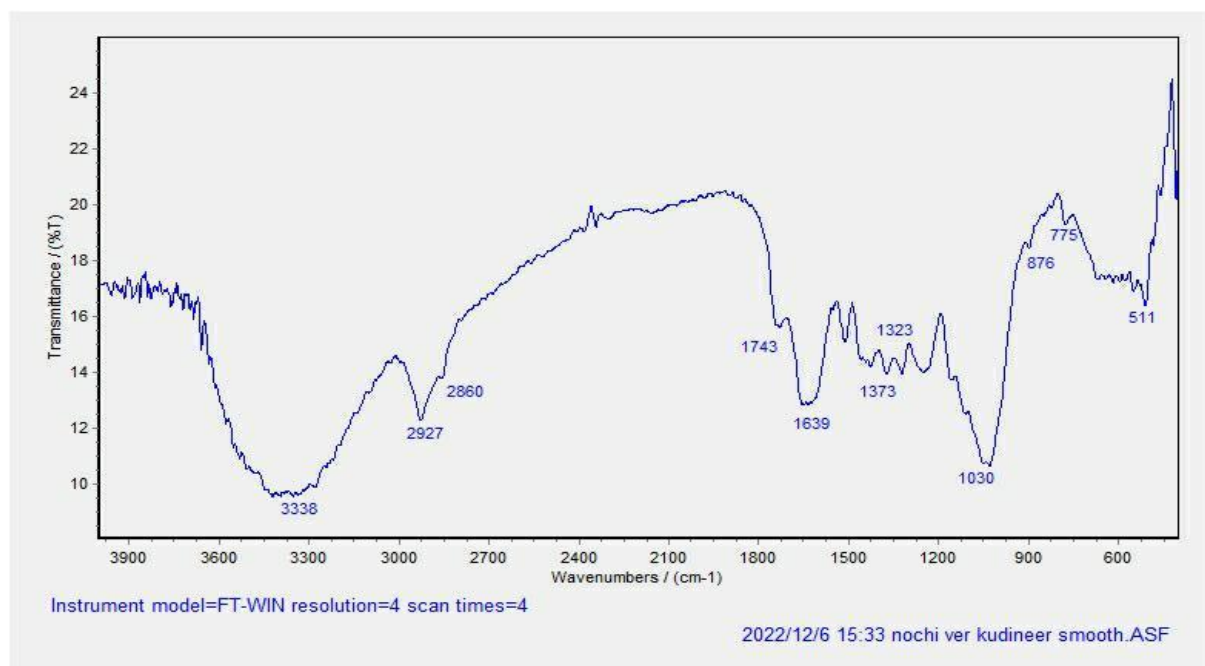
**Indication:** Thandagavatham (Lumbar spondylosis)

## Results and Discussion

### FT-IR 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 Nochi ver kudineer Chooranam.

Figure 1: FT-IR Spectra of Nochi ver kudineer Chooranam.

**Table: 2 List of functional groups .**

S.No	Wave Number (cm <sup>-1</sup> )	Vibrational Modes of Nochi ver kudineer Chooranam in IR region	Functional groups
1	3338	N-H Stretching O-H Stretching	Secondary amine, Aliphatic primary amine. Alcohol
2	2927	O-H Stretching C-H Stretching	Alcohol, Carboxylic acid. Alkane
3	2860	O-H Stretching, C-H Stretching N-H Stretching	Alcohol, Alkane Amine salt.
4	1743	C=O Stretching C-H Bending	Esters, Delta lactone Aromatic Compound.
5	1639	C=C Stretching N-H Bending	Alkane, Conjugate alkene, Cyclic alkene Amine
6	1373	O-H Bending, O-H Bending C-F Stretching	Pheno, Alcohol. Fluro compound
7	1323	C-N Stretching, S=O Stretching, O-H Bending, C-F Stretching	Amine, Aromatic amine, Sulfone, Phenol, Fluro compound
8	1030	S=O Stretching, C-N Stretching, C-F Stretching	Sulfoxide, Amine, Fluro compound
9	876	C-H bending	1,2,4- trisubstituted, 1,3- disubstituted
10	775	C-H bending C-Cl Stretching	1,2,3- trisubstituted, 1,2- disubstituted Halo compound
11	511	C-I Stretching	Halo compound.

From the above analysis, the Nochi ver kudineer Chooranam is known to have Secondary amine, Primary aliphatic amine, Alcohol, Carboxylic acid, Alkane, Amine salt, Esters, Delta lactone, Aromatic Compound, Alkene, Conjugate alkene, Cyclic alkene, Phenol, Aromatic amine, Sulfoxide, Fluoro compound, Sulfoxide, 1,2,4-trisubstituted, 1,3-disubstituted, 1,2,3-trisubstituted, 1,2-disubstituted, Halo compound. These compounds have some pharmaceutical properties and are responsible for the therapeutic action of the drug. They are briefly discussed below.

### **Alcohol:**

Moderate alcohol consumption reduces biomarkers of inflammation, including c-reactive protein (CRP), interleukin-6, and TNF-alpha receptor 2 says Karen Costenbader, MD, MPH, a rheumatologist at Brigham and Women's Hospital in Boston. Alcohol's anti-inflammatory effects are also thought to be one of the reasons it appears to lower cardiovascular disease risk in moderate drinkers. Alcohol is an effective analgesic that delivers clinically-relevant reductions in ratings of pain.

### **Carboxylic acid:**

It has analgesic, antipyretic and anti-inflammatory activity. Non-steroidal anti-inflammatory drugs (NSAIDs) with free carboxylic acids are used worldwide to treat inflammatory and immune diseases such as pain, rheumatoid arthritis, and cancer but is mainly used as analgesics in the short term management of moderate to severe pain. Carboxylic acid in the highest primary functional group of Acetyl salicylic acid.

### **Esters:**

It has anti inflammatory activity. Anti oedematogenic assay demonstrate anti inflammatory activity of Borneol Esters in an experimental model acute inflammation.

### **Lactones:**

It has Anti inflammatory, Anti microbial, Anti tumour, Anti Bacterial, Anti Fungal, Anti

plasmodial, Healing and Hepato protective activity.

### **Amine:**

Biological amines have analgesic and Anti-inflammatory properties. Biological amine play an essential role in cell membrane stabilization, immune function and prevention of chronic disease as they participate in the nucleic acid synthesis and Protein synthesis. Besides they are compounds created as a growth regulation, neural transmission and inflammatory mediators.

### **Phenols**

Phenolic compounds are able to inhibit either the production or the action of pro inflammatory mediators resulting in anti inflammatory capacity. Plant-based compounds containing phenol are known to be anti-oxidants. This means that they can stop the reaction of free radicals with other molecules in your body, preventing damage to your DNA as well as long-term health have anti-oxidant property.

### **Sulfones:**

It has a Anti inflammatory, Analgesic, Anti cancerous, Anti microbial, Anti malarial activity.

### **Sulfoxide:**

Dimethylsulfoxide is used topically to decrease pain and speed the healing of wound, burns and muscle and skeletal injuries. Dimethyl sulfoxide is also used topically to treat painful condition such as head ache, inflammation, Osteoarthritis, rheumatoid arthritis.

### **Fluoro compound:**

The physicochemical properties and analgesic action of six fluorinated analogues of 4-hydroxyacetanilide (paracetamol) have been investigated. Fluorine substitution adjacent to the hydroxyl group increased lipophilicity and oxidation potential whilst substitution adjacent to the amide had little effect on lipophilicity but led to a greater increase in oxidation potential.

## Conclusion

From the above study concluded the Nochi ver kudineer Chooranam is known to have the functional groups like N-H Stretching(Secondary amine, Aliphatic primary amine),O-H Stretching (Alcohol), O-H Stretching(Carboxylic acid, Alcohol), C-H Stretching (Alkane), N- H Stretching (Amine salt), C=O Stretching (Esters, Lactone), C-H bending (Aromatic Compound), C=C Stretching (Alkene, Conjugated alkene, Cyclic alkene ), N-H Bending (Amine), O-H Bending(Phenol), O-H Bending (Alcohol), C-F Stretching(Fluoro compound), C-N Stretching (Amine, Aromatic amine), S=O stretching(Sulfone), S=O Stretching(Sulfoxide),C-HBending(1,2,4- trisubstituted,1,3-disubstituted), C-H Bending(1,2,3-trisubstituted,1,2- disubstituted), C-Cl Stretching (Halo compound), C-I Stretching(Halo compound).The functional groups present in the Nochi ver kudineer Chooranam have Analgesic, Anti-inflammatory, Anti oxidant activities. This will ensure the efficacy and therapeutic effect of the drug Nochi ver kudineer Chooranam. This study forms the base for the pharmaceutical analysis of the Nochi ver kudineer Chooranam.

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