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# INTERNATIONAL JOURNAL OF CURRENT RESEARCH IN CHEMISTRY AND PHARMACEUTICAL SCIENCES

(p-ISSN: 2348-5213; e-ISSN: 2348-5221)

[www.ijcreps.com](http://www.ijcreps.com)

(A Peer Reviewed, Referred, Indexed and Open Access Journal)

DOI: 10.22192/ijcreps

Coden: IJCROO(USA)

Volume 9, Issue 6 - 2022

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## Research Article



DOI: <http://dx.doi.org/10.22192/ijcreps.2022.09.06.004>

## Evaluation of Phytoconstituents of Vellarivithai Chooranam by FTIR, UV-VIS Spectroscopy and Powder microscopy

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### Abstract

**Background:** Food is medicine and medicine is food is one of the basic principle of the Siddha system of medicine. Vellarivithai chooranam is a herbal drug indicated for kalladaippu (Urolithiasis) noi referred from Siddha Materia Medica. **Aim:** The purpose of the study is to monitor the phytochemical constituents in Vellarivithai chooranam by Fourier Transform Infrared Spectroscopy, Ultra Violet Visible Spectroscopy and powder microscopy. **Materials and Methods:** The dried seeds of Vellarivithai are ground into fine powder and filtered to get the chooranam. The bioactive compounds of Vellarivithai chooranam are evaluated using Fourier Transform Infrared Spectroscopy, Ultra Visible Spectroscopy and powder microscopy. **Results:** The FTIR analysis confirmed the presence of C-H, carboxylate, O-H, aryl-O-, C-F, P-O-C, C-O-O-, C-Cl, S-S functional groups. Ultra Violet Visible Spectroscopy showed that the absorption peak existed at 223nm, 251nm, 290nm and 339nm. In Powder Microscopy, Vellarivithai chooranam was observed under 10X and 40X objective of bright field microscope revealed the presence of aleurone grains. **Conclusion:** The result of this study offer a platform of using Vellarivithai chooranam as a herbal alternative for Kalladaippu (Urolithiasis) noi and it can be used as functional and pharmaceutical food.

**Keywords:** Vellarivithai chooranam, FTIR, Powder microscopy, UV Visible Spectroscopy

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## Introduction

Plants are used medicinally in different countries and are source of potent and powerful drugs<sup>[1]</sup>. A wide range of medicinal plant parts are used as raw drugs as they possess varied medicinal properties. Thus herbal drugs constitute a major part in all traditional systems of medicine. Plants above all other agents have been used for medicine from time immemorial because they have fitted the immediate personal need are easily accessible and inexpensive.<sup>[2]</sup>The recent increase in the use of alternative medicine has led to more research regarding alternatives and requires education of physicians on the subject to enable them to better inform and care for their patients.<sup>[3]</sup>

The Siddha system of medicine is a traditional system of medicine nurturing the mankind from home immemorial. The Siddha system of medicine is one of the oldest traditional systems of medicine, which has been originated from India and is practiced in the southern part of this country for treating various diseases including chronic conditions.<sup>[4]</sup>The WHO has estimated that approximately 60 to 70% of the world's population rely on traditional medicine for their health needs.<sup>[5]</sup>

Vellarivithai chooranam is a herbal drug indicated for Kalldaippu (Urolithiasis) in Siddha classical literature. It is also used for leucorrhoea, painful micturition, stranguria, urinary passage infections.<sup>[6,7]</sup> In this study further evaluation of phytochemical constituents in Vellarivithai Chooranam by FTIR, UV-Vis spectroscopy and Powder microscopy are carried out.

## Materials and Methods

The Vellarivithai was purchased from the country shop and identified by the Medical Botanist of Govt. Siddha Medical College, Palayamkottai. The raw drug was shade dried, powdered and stored in air tight containers. It was labeled as 'Vellarivithai chooranam' and used for the experimental purposes.

## FTIR Spectroscopic analysis

Fourier Transform Infrared Spectrophotometer is the most powerful analytical used for identifying the functional groups in the compound. Dried powders of alcohol solvent extract extract was used for FTIR analysis. 10mg of the dried powder extract was encapsulated in KBr pellet, in order to prepare translucent sample disc. The powdered sample was loaded in FTIR Spectroscope (Shimadzu, IR Affinity1, Japan), with a scan range from 400 to 4000 $\text{cm}^{-1}$  with a resolution of 4 $\text{cm}^{-1}$ <sup>[8]</sup>.

## Ultra Violet-Visible (UV-Vis) spectroscopy

The alcohol extract of the drug was subjected to Ultra Violet-Visible spectroscopic analysis. The extract was scanned at wave length ranging from 190 to 1100 nm using Ultra Violet-Visible spectrophotometer (Model: UV3120) and the characteristic peaks were detected and recorded.

## Powder microscopy

About 0.5gm of the powdered sample was mounted in glycerin at room temperature for 2 h and observed under 10X and 40X objective of bright field microscope (Meswox, India) for powder characteristics. Photomicrographs of diagnostic characters were captured using attached camera.

## Results and Discussion

### FTIR Spectroscopic analysis

Fourier Transform Infrared Spectroscopy is one of the important analytical techniques. This characterization analysis is quite rapid, good in accuracy and relatively sensible.<sup>[8]</sup> FTIR spectrum was used to identify the functional group of the phytochemical constituents present in the drug based on the peak values in the region of IR radiation. When the extract was passed into the FTIR, the functional group of the components are separated based on its peak values. The FTIR analysis confirmed the presence of functional groups mentioned in (Figure.1 and Table.1<sup>[9,10,11,12]</sup>).

Table.1.FTIR Peak values of Alcoholic extract of Vellarivithai chooranam

Peak Values	Functional Group	Phytoconstituents present
2916	C-H stretch, O-H stretch, N-H stretch	Methylene, carboxylic acid, alcohol, amine salt
1668	C=N stretching,C=O stretching	Imine/oxime, conjugated ketone
1552	C=C,C=O	Aromatic, amide
1373	O-H stretch	Phenol or tertiary alcohol
1259	Aryl-O-stretch, C-O stretch	Aromatic esters, alkyl aryl ether
1117	C-F stretch, C-O stretch	Aliphatic fluoro compounds, secondary alcohol
1011	(P-O-C stretch),C-F stretch	Aliphatic phosphates,fluoro compound
881	C-O-O- stretch,C-H bending	Aromatics,1,2,4-trisubstituted,1,3-disubstituted
777	(C-Cl stretch)	Aliphatic chloro compounds
604	(S-S stretch), C-Cl stretch, C-Br stretch	Di sulphides, halo compound

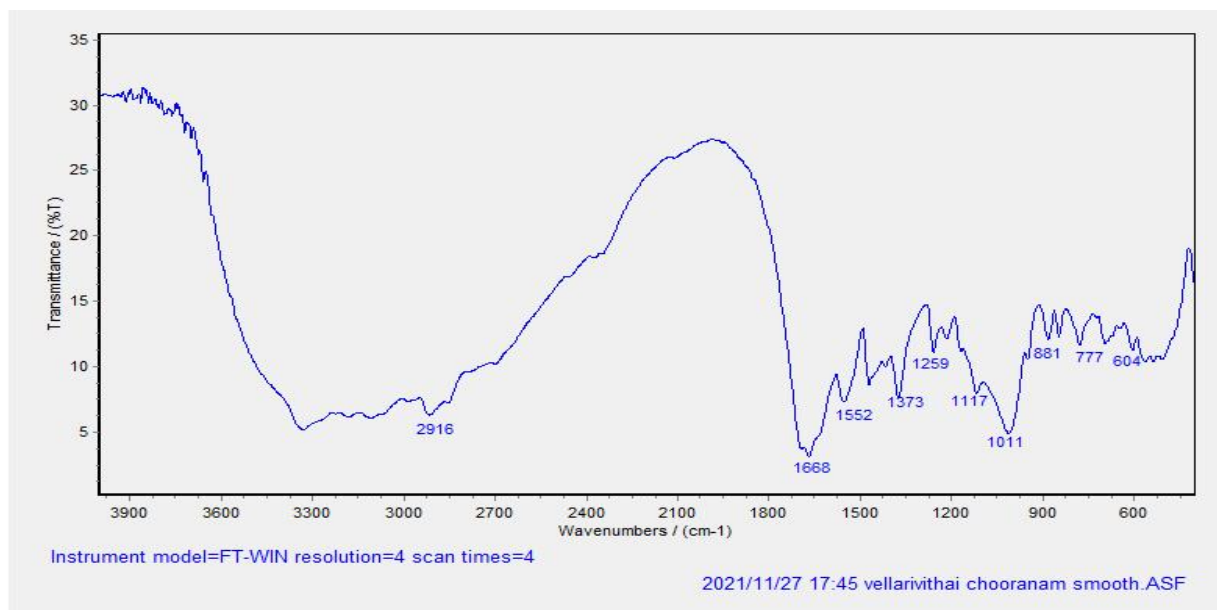


Figure.1.FTIR analysis of Vellarivithai chooranam

From the above Table.1 & Figure.1, Vellarivithai chooranam contains methylene, carboxylic acid, alcohol, amine salt, imine, conjugated ketone, aromatic compounds, amide compounds, phenol, aromatic esters, alkyl aryl ether, aliphatic fluoro compounds, secondary alcohol, aliphatic phosphates, fluoro compound, aromatics, 1,2,4-trisubstituted, 1,3-disubstituted, aliphatic chloro compounds, disulphides and halo compound which are necessary for the therapeutic action of the compound.

### UV-Visible Spectroscopy

UV-Visible Spectroscopy is a simple, cost-effective and rapid test for detecting

phytochemicals. This technique uses light in the visible or its adjacent ranges of wavelength. The colour of the chemicals involved directly affects

the absorption in the visible range. In this technique, molecules undergo transitions in an electromagnetic spectrum.<sup>[12]</sup> The results presented in Figure.2. show the UV-Vis Spectra of Vellarivithai chooranam. The UV-Vis profile of Vellarivithai chooranam was studied over 190-1100nm wavelength because of sharpness of peaks and proper baseline. The profile showed the peaks at 223nm, 251nm, 290nm and 339nm with the absorption 2.61, 2.51, 4.27 and 2.11 respectively.<sup>[13,14]</sup>

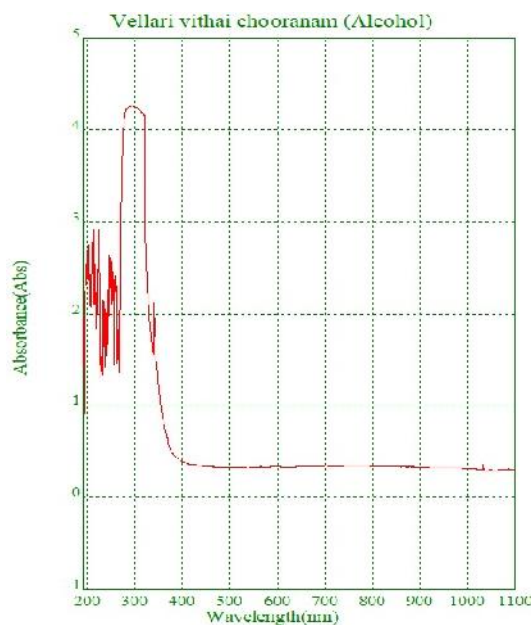
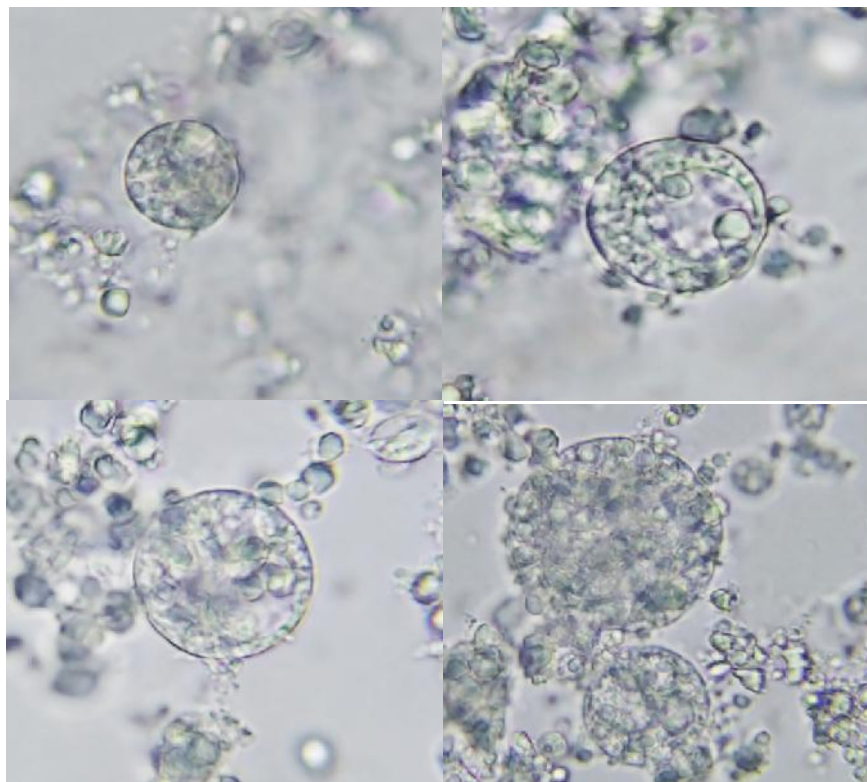


Figure. 2. UV-Visible Spectroscopy of Vellarivithai chooranam

### Powder Microscopy

The powder microscopy revealed the presence of aleurone grains. The phytic acid present in aleurone grains chelates the calcium formation and thus helps in reducing the stones<sup>[15]</sup>.



**Figure.3. Powder microscopy of Vellarivithai chooranam reveals aleurone grains in 10X and 40X**

## Conclusion

The result of this study offer a platform of using Vellarivithai chooranam as a herbal alternative for Kalladaippu (Urolithiasis) noi and it can be used as a functional and pharmaceutical food.Hence it is concluded that Vellarivithai chooranam is highly effective in the management of Kalladaippu (Urolithiasis).

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DOI: [10.22192/ijcrops.2022.09.06.004](https://doi.org/10.22192/ijcrops.2022.09.06.004)

**How to cite this article:**

R.Suhanthni, A.Manoharan, T.Komalavalli. (2022). Evaluation of Phytoconstituents of Vellarivithai Chooranam by FTIR, UV-VIS Spectroscopy and Powder microscopy. *Int. J. Curr. Res. Chem. Pharm. Sci.* 9(6): 35-40.

DOI: <http://dx.doi.org/10.22192/ijcrops.2022.09.06.004>