International Journal of Reverse Pharmacology and Health Research (IJRPHR)

Research article

# A Spectroscopic and FTIR analysis of Siddha Mineral drug Appalakara Chooranam

**Thavakeethan. P*[1], Manoharan.A[2]**

[1]PG Scholar, Department of Maruthuvam, GSMC, Palayamkottai, Tamilnadu, India,

[2]Professor, Head of the Department, Department of PothuMaruthuvam, GSMC, Palayamkottai,Tamilnadu, India

## Abstract

**Background:** The Siddha system of medicine is one among part of the AYUSH system.The siddha medicine is using various clinical conditions,especially in degenerative diseases and gastro intestinal disorders .Almost it has prepared the medicines from Herbals ,Minerals salts and Metalsas well as the marine and animals products also used in the system. The drug Appalakara chooraranam is basically salt in taste and crystal powder in nature which is widely used in siddha medicine for Gastro –intestinal disorders.

**Objective:** To explore the morphology and elemental characterization of the mineral salt *Appalakara chooranam*

**Methods:** The structural morphology and characteristic features using in SEM, determination of trace elements by Energy dispersive X-ray analysis and Functional Group through FTIRstudy. It can be correlated in WHO recommended parameters for confirmed the standardizations in above drug.

**Results:** The results correlated in SEM analysis showed Average Particle Size ranges from 296 µm to 2792 µm.In FTIR studies should markedly increase value from 3462.22 to 3695.61 respectively, which is indicated its contains most of them in Phenolic compound, Halo compound and Isothiocyanate.In EDAX experiment results showed most of them contains Sodium&Potassium.

**Conclusion:** All the modern scientific parameters provide it is minimal size particals and good characteristic nature of the drug. So *Appalakara chooranam is* highly therapeutic and bio availability value used cured in gastro intestinal tract diseases.

## Keywords

## Introduction

The World Health Organization (WHO) is estimated that 80% of populations were used traditional medicinesin developing countries for primary health care needs (WHO Guidelines-2007). In that way, Siddha medicine has profound vitalrole in disease, prevention and prophylaxis through its herbal medicine and other form of medicine like chendooram, Parpam and other 32 types ofpreparation (Thiyagarajan.R-2006).

***Address for correspondence:***

***Thavakeethan P***

[1]Post Graduate Scholar, Department of Maruthuvam, GSMC, Palayamkottai, Tamilnadu, India

CODENJ : IJRPHR



***To access this article online***

*Website :* http://www.ijrphr.com/

DOI : 10.121/ijrphr/02.0203.306

*Quick response code*

**How to cite this article:**

Thavakeethan P, Manoharan A, A Spectroscopic and FTIR analysis of Siddha Mineral drug *Appalakara Chooranam*, International Journal of Reverse Pharmacology and Health Research, 2019, 2(1), 16-20

**Received:** January, 2018.

**Accepted:** March, 2019.

The standardization of drug and clinical efficacy of study inAppalakarachooranam (Kandasamypillai.S- 2012), here performed the Spectrocopic standardization of appalakarachoornam, which is collected from coastal area. The spectroscopic standardization Scanning electron microscoping, Energy Dispersion X-ray Spectrometric analysis and Infra-red (FTIR) studies were used and results was documented.

The spectroscopic standardization to help thereducing the adulteration and definitely helps to understand the characterization of selectedingredients. Modernparameters are very useful to find outthe drug adulteration andmisidentification. The unidentified chemical compounds, physiochemical compounds were produced hazards to human health.so,Indian system of medicine is needed to standardization.so, saint siddhars were used purification methods (sutthimurigal) in ancient periods, The structural standardization will proved via spectroscopic studies and FTIR analysis. As per guidelines of WHOand AYUSH insisted the guidelines for quality control to better standardization of the drugs as pertain to Pharmacopeia Laboratory of Indian Medicine (PLIM)

The Systematic steps should be taken to standardization of traditional drugs by using modern technique like SEM, EDAXand FTIR etc

## Materials and Methods

TheAppalakaram(Sodium carbonate) is available in three varieties of carbonates. The drug applakkaram is mentioned Gunapadamthathujeevavaguppu in siddha text.Theapplakkaram was collected from Madurai siddha traditional medical shop. The collected drug is experimental for modern diagnostic analysis.Applakaram was confirmed by siddha pharmacologist.

### Review and literature

In siddha text "Gunapadamthathujeevavakuppu" page no. 368 is mentioned the indication of applakarachoornam

**General Characteristics (பொதுக்குணம்)**

*"குடல்வாதஞ் சூலை கொடிதான வாதம்*
*அடல்புரியு மைய மடுக்கும்-நெடுவயிற்றின்*
*உப்புசத்தி னோட உயர்குன்ம நோயகற்று*
*மப்பளக் காரமது."*

**Constituents of appalakaram(Sodium carbonate):**

Based on literature review, chemically it consists of Sodium bicarbonate reduced hyperchlohyderia, GERD and acid peptic disorders.so, the clinical drug is acted in good antacid. (WebMD - Sodium bicarbonate)

**Physio chemical characters of appalakaram(Sodium carbonate):**

It occurs in porous granular masses of a greyish white in colour orheavy hard pieces with a strong alkaline taste of soda.It is an antacid and a diuretic(WebMD – Sodium bicarbonate). The Properties ofIndhuppu (rock salt) generally like those of Appalakaram. Rock salt is useful for dyspepsia, vomiting, diarrhoea,flautulence and urinary disease etc (In siddha text Thiyagarajan.R2006 andBellisola G, Sorio C. 2012).This is mentioned in classical text book ("Gunapadamthathujeevavakuppu" page no. 371)in below lines,

**General Characteristics (பொதுக் குணம்)**

*"அட்டகுன்ம மந்தம் அசிர்க்கரஞ்சூர் சீதபித்தந்*
*துட்டவையம் நாடிப்புண் டோடங்கள்-கெட்டமலக்*
*கட்டுவிட விந்தையக் காமியநோய் வன்கரப்பான்*
*விட்டுவிட விந்துப்பை விள்."*

**Scanning electron microscopic study (SEM)**

Scanning electron microscopy is a complementary technique and shows the nature of Appalakarachooranam and its particle size.Sample for SEM analysis were mounted on the specimen stub using carbon adhesive sheet. Small sample were mounted with 1sq. cm glass slide And kept in carbon adhesive sheet (Yashvanth.S et al 2013) Samples were coated with gold to a thickness of 100 AO using Hitachi vacuum evaporator. Coated sample were analyzed in a Hitachi Scanning electron Microscope 3000 H model. Then the electronic image was captured and noted.

### Elemental analysis by EDAX

EDAX is a non destructive technique and can be used for evaluvation in physiochemical properties of Applakara Choornam. This is very useful for the characterize crystalsof traceelements inAppalakaraChooranam (AKC). The Small pieces of salt of (3-4 mm) and 5-6mm2 pieces of salt were fixed in 4% glutraldehyde in phosphate buffer (Viz PH value 0.02 M, 6.9 M respectively). The sample was air dried and coated with gold in Hitachi HUS-5 GB Vacuum evaporator. SEM-EDAX analysis was carried out using INCA X-sight Oxford detector fitted to Hitachi S-520 Scanning Electron (Tortoriello.J et al – 2006) Microscope at an acceleration voltage of 20 KV.

## Results and Discussion

### Fourier Transform – Infra Red Spectroscopy Study (FTIR)

IR data acquired with Spectrum one FT-IR Spectrometer by means of KBr Pellet was used,. about 1/8th of the solid powder of Appalakarachooranam was taken on a microspatula and about 0.25-0.50 teaspoons of KBr was added and thoroughly ground in an agate mortar with the pestle until AKC.The sample was pressed at 5000-10,000 psi and the sample was removed carefully from the die and placed in the FTIR sample holder (Tortoriello.J et al 2006)

The sample was placed on Zn,Sel crystal with a spatula until the pressure marker noted.

## Results and Discussion

The results of Scanning electron microscope in two different view and EDAX Trace elements profile & FT-IR data has compiled as follows.

### Scanning Electron Microscope Analysis

The SEM (Fig.No.1 a)under 1.00 KX resolutions and the examining area of 800x800µm and 2 surface were taken. The surface of the AKC grains is uniformly arranged in agglomerates. Particle Size of the desired drug particle ranges from 3µm to 1613 µm in 2 µm (Figure 1 b).


**Fig. No.1 a** **Fig. No.1 b**

In 100mu view, the surface of the sample grains is uniformly agglomerates. Particle Size ranges from Particle Size of the desired drug particle ranges from 296µm to 2792 µm. (Figure. 2 a &b) SEM image and plotting diagram of Appalakarachooranam in 20µm

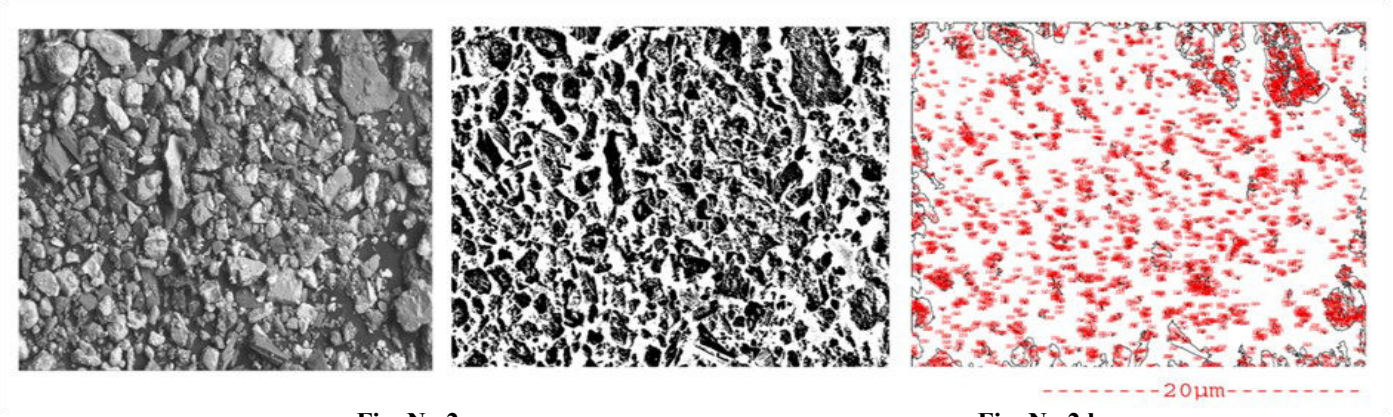



**Fig. No.2 a** **Fig. No.2 b**

### Elemental Quantification of Appalakarachooranam by EDAX

The elemental quantification of *Appalakara-chooranam* was carried by the SEM-EDAX meth-ods.The overall trace elements like Sodium,potassium, Chlorine and oxygen viz35.59%, 30.29%, 18.07, 30.29% respectively.

In FT-IR Spectra analysis, the values are recorded in **table no 1**.The peak value is 3462.22 to 3695.61 onO-H stretching, 2520.96 has C-H stretching, 2380.16 has N-H stretching, 2254.79 has -C≡Nstretching, 2108.20 has N=C=S stretching, 1635.64 has C=C stretching, 1460.11 has C-H bending, 1336.67 has O-H bending. Thus the corresponding peak valuehas separate functional groups viz Alcohol, Alkene, Amine salt, nitrates, Isothyiocyante, Alkenes, and Phenolic compound etc.


ISSN 2589 3343

***Figure 3*** **Identification of trance elements through EDAX**

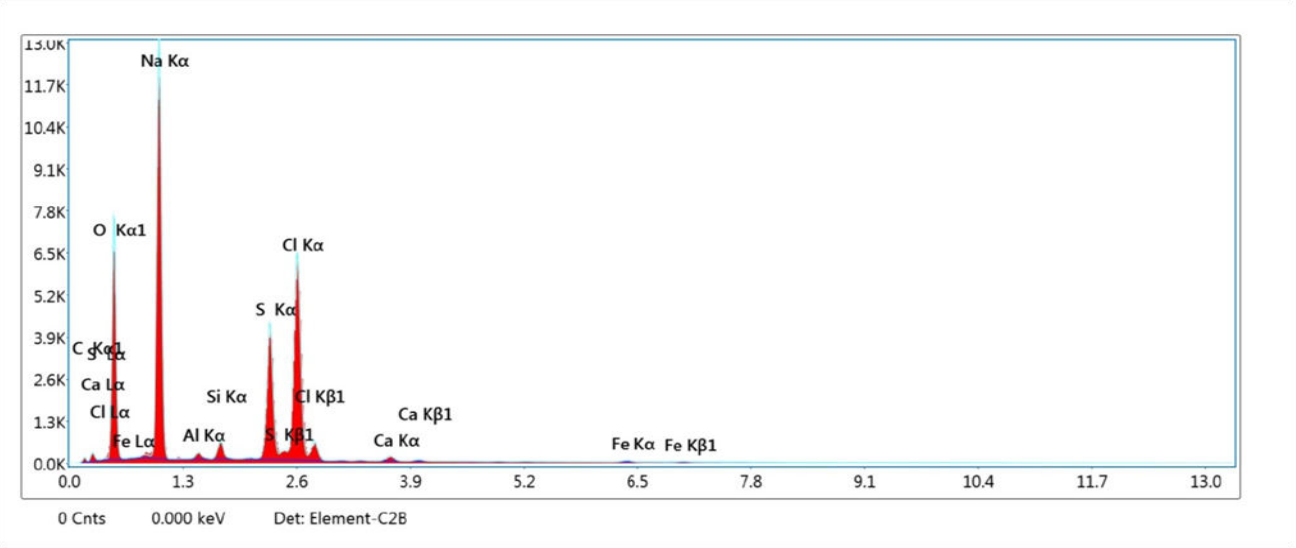



***Figure 4*** **Graphical representation of EDAX Profile**

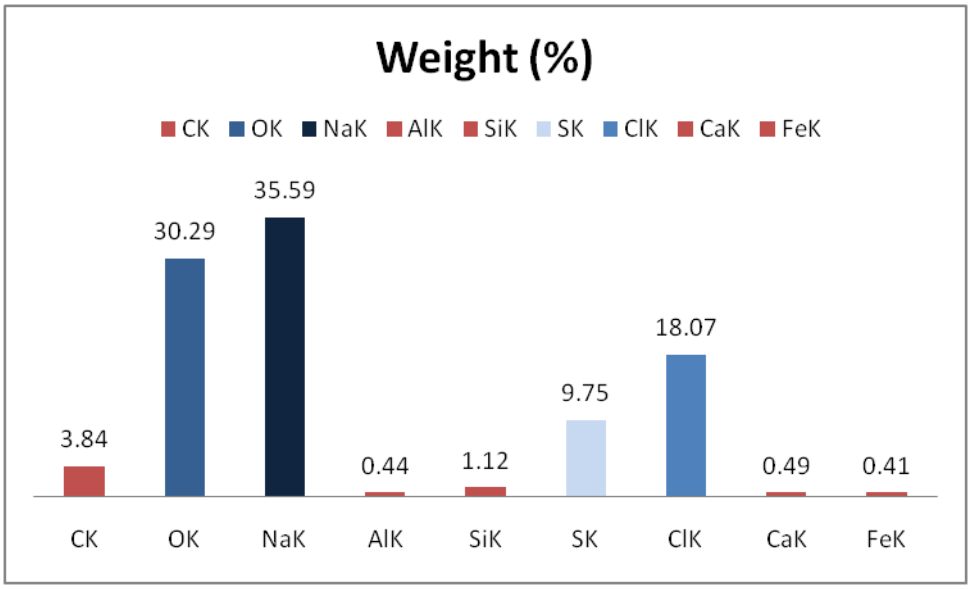
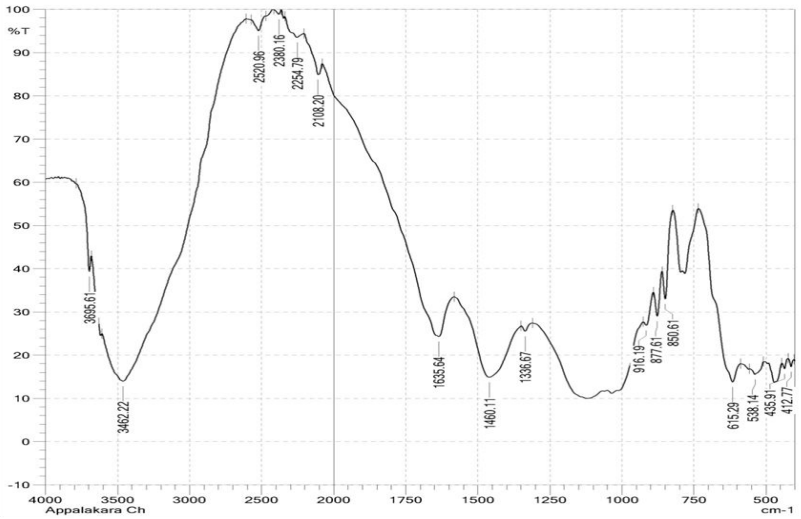



***Figure 5*** **FTIR Spectra of *Appalakara Chooranam***






ISSN 2589 3343

***Table 1. FTIR observed Peak value of* Appalakara chooranam**

| Wave number | Intensity of the bond | Strength | Functional groups |
|---|---|---|---|
| 3695.61 | O-H stretching | variable | alcohol |
| 3462.22 | O-H stretching | Variable | intermolecular bonded |
| 2520.96 | C-H streching | Medium | Alkene |
| 2380.16 | N-H stretching | Strong | amine salt |
| 2254.79 | -C≡Nstretching | Weak | nitrile |
| 2108.20 | N=C=S stretching | Strong | Isothiocyanate |
| 1635.64 | C=C stretching | Medium | Alkene |
| 1460.11 | C-H bending | Medium | Alkane |
| 1336.67 | O-H bending | medium | Phenolic compound |
| 916.19 | C=C bending | Strong | Alkene |
| 877.61 | aromatic C-H bending | medium | Alkane |
| 850.61 | C-Cl stretching | Strong | halo compound |
| 615.29 | C-Br stretching | Strong | halo compound (alkyl) |
| 538.14 | C-Br bending | Week | Alkyl |

## Conclusion

In Siddha System of medicine is bioeffective and safe therapeutic potentials of AKC. On the line, the drug Appalakarachooranam lies on the track and the above data showed that the spectroscopic standardization of the AKC. Final conclusion is FTIR, EDAX and SEM analytical studies showed no harmful chemicals and minerals etc.so, applakarra choornam is safe to use in long period. Thefurther research works has to be carried out for the development of scientific data to hold the drug in a scientific manner.

## Source of Support

Nil

## Conflict of Interest

None declared

## References


1. WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues, World Health Organization, Geneva, 2007.
2. Thiyagarajan.R, Siddha MateriaMedica- Mineral& Animal section, Dept of Indian Medicine and Homeopathy, Chennai, Govt of Tamilnadu, 2006, 686-88
3. Singh A, Duggal S. Piperine Review of Advances in Pharmacology, Inter. J. Pharma. Sci. Nanotech 2009; 2: 615-20
4. Kandasamypillai.S, History of Siddha Medicine, Published by:Deptartments of IM&H, Chennai – 106, Edition : 2012; 13
5. Thiyakarajan.R, GunapadamThathuJeevavaguppu, 2st Edition, Published by Department of Indian Medicine and Homeopathy, 2016.
6. Krishnan, K.S., 1998. The wealth of India. Raw Mater. 10: 171-171.
7. Bellisola G, Sorio C. Infrared spectroscopy and microscopy in cancer research and diagnosis. Am J Cancer Res 2012; 2:1-21. 9.
8. Yashvanth S, Shobha Rani S, Madhavendra SS. Micro Chemical (Elemental) Analysis of *Leucasaspera*(Wild) Link Employing SEM-EDAX. Internationa Journal of Pharmaceutical Sciences and Drug Research 2013; 5 (1): 32-35.
9. Tortoriello J, Maribel HR, Cortazar MG, Ferrer EJ, Zamilpa A, Alvar L, Ramirez G, et al. Anxiolytic effects of natural galphimines from *Galphimiaglauca*and their chemical derivatives. J Nat Prod 2006; 69: 59-61.
10. WebMD ( Sodium bicarbonate ), Online source of document, 2019