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Research Article

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Standardization of a novel Siddha drug "*Chandamaarutha Chendhooram*" through characterisation by Physico-Chemical analysis and Fourier Transform Infrared Radiation (FTIR) analysis.

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Abstract

Traditional medicine has a long history with its origin and healing diseases. It is the total sum of the knowledge, skills and practices based on the theories, beliefs, and experiences indigenous to different cultures, whether explicable or not. It is also used in the maintenance of health, as well as preparation, diagnosis, improvement, or treatment of physical and mental illness.

Siddha system of medicine plays an important role in meeting the demands of primary health care in many developing countries. Siddha system of medicine is always a unique due to the interpretation of metals and minerals in their preparations. However Siddha system of medicine with its nature of healing the diseases gaining the importance throughout the World, one of the barrier is the lack of standardization.

So, standardization is necessary for the traditional drugs before its clinical applications. In this present study "*Chandamaarutha Chendhooram*" has been standardise through the modern instrumental techniques such as physic-chemical analysis and Fourier Transform Infrared Radiation (FTIR) analysis will create a fingerprints to standardise the traditional system of medicine.

Keywords: Siddha system, *Chandamaarutha Chendhooram,* physic-chemical analysis, FTIR.

Introduction

Nature has given much more remedies for treating various diseases which were diverged around this Word.Siddhars were the superman with super natural scientists. They found the system called siddha system of medicine[1].

Nature is itself be the best physician

- Hippocrates

Siddha system of medicine is the oldest system of medicine in India. The term Siddha represents an object to be achieved. Siddhars were the saints who were specialist in making higher order medicines from plants, metals, minerals and animal products[2]

In Siddha system of medicine the using of higher order drugs were much more predominant in compared with other traditional system. The using of metals, minerals, other chemicals were far more in siddha system of medicine than other systems like Ayurvedha[3]

"*Chandamaarutha Chendhooram*" is one of siddha formulation which was mentioned in the classical siddha literature. Even though the siddha system of medicine were so effective to globalize the wealth of Siddha, there was a need for standardization of siddha drug. So, standardization is necessary for the traditional drugs before its clinical applications. In this present study "*Chandamaarutha Chendhooram*" has been standardise through the modern instrumental techniques such as physic-chemical analysis and Fourier Transform Infrared Radiation (FTIR) analysis will create a fingerprints to standardise the traditional system of medicine.

Materials and Methods

Drug selection:

In this research paper purified and prepared **"*Chandamaarutha Chendhooram*"** was taken as a trial drug for cancer from the Siddha literature "*Anubogavaidhiya navaneedham* (part 4).

Collection of the plant materials:

All the raw materials were bought from the Ramasamy Mudhaliyar Store, Parry's corner, Chennai.

Identification and authentication:

All the raw drugs were identified and authenticated at Gunapadam experts in Govt Siddha Medical College, Chennai and this compound drug was prepared in the Gunapadam department in Govt Siddha Medical College, Arumbakkam, Chennai.

Ingredients:

The ingredients of "*Chandamaarutha Chendhooram*" are 1.Purified Mercuric sulphide, 2. Purified Mercurous chloride, 3. Purified Elemental Sulphur, 4. Purified Red Sulphide of Mercury, 5. Mercury chloride, 6. Egg white as mentioned in *Anubogavaidhiya navaneedham* (part 4).

Fig no: 1.1. Purified Mercuric sulphide

Fig no: 2.2. Purified Mercurous chloride

Fig no: 3.3. Purified Elemental Sulphur

Fig no: 4.4. Purified Red Sulphide of Mercury

Fig no: 5.5 purified Mercuric chloride

Fig no: 6. 6. Egg white

Fig no: 7 .Final product "*Chandamaarutha Chendhooram*" (CMC)

Identification and authentication:

All the raw drugs were identified and authenticated at Gunapadam experts in Govt Siddha Medical College, Chennai and this compound drug was prepared in the Gunapadam department in Govt Siddha Medical College, Arumbakkam, Chennai.

Fig no: 8. *Chandamaarutha Chendhooram*

Procedure:

The ingredients were powdered in a stone mortar. Then it was ground for about 6 hrs by adding egg white little by little and made into pellets, let dry. Water was taken in a new pot and boiled. Now, the pellets was introduced into the boiling water. The boiled pellets was dried and collected. Then raw rice and bottle guard were placed in the pot and boiled as said before.1-2 mins later the pellets were added into the pot and was taken immediately. It was then washed with cold water and dried in the sunlight.

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Storage of the drug:

The prepared test drug was stored in a clean, air tight glass container.

Administration of the drug:

Form of the medicine	: *Chendhooram*
Route of Administration	: Enteral
Dose	: 488mg
Adjuvant	: Thirukadugu
Indication	**:** Cancer[4]

Drug standardization:

Standardization of drug means confirmation of its identity, determination of its quality, purity and detection of nature of adulterant by various parameters like morphological, microscopical, physical, chemical and biological evaluations.

Analysis as per AYUSH guidelines

1. Floating on Water:

A pinch of *Chendhooram* gently placed on the still surface of water in a vessel, did not sink immediately. It was found that the "*Chandamaarutha Chendhooram*" particles floated over the surface of water indicated lightness of the trial drug.

2. Lines on fingers:

Chendhooram in well prepared form should be as fine powder. When taken between thumb and index finger, the fine powder will fill up the lines of the finger print. A pinch of "*Chandamaarutha Chendhooram*" was taken in between the thumb and index finger and rubbed. It was found that the"*Chandamaarutha Chendhooram*" entered into the lines of the finger and was not easily washed out from the lines, confirmed its fineness.

3. Irreversible reaction:

The well prepared *Chendhooram* does not get reversible to its metallic state when heated with a mixture of cane jaggery, hemp powder, ghee and honey. A pinch of "*Chandamaarutha Chendhooram*" was taken and mixed with cane jaggery, ghee and honey. It was observed that "*Chandamaarutha Chendhooram*" did not reverse to its metallic state.

4. Tasteless:

The well prepared *Chendhooram* should be completely tasteless. Presence of any taste like sweet or bitter indicate incomplete preparation which needed another Calcination process. When a small amount of "*Chandamaarutha Chendhooram*" was kept on the tip of the tongue, no specific taste was found.

5. Lusterless:

If any shining particle is present in *Chendhooram*, it indicates that the *Chendhooram* is not manufactured properly and contains unchanged substances like minerals, metals and other toxic substances. There should be no shining particles present in the well manufactured *Chendhooram*. "*Chandamaarutha Chendhooram*" was taken in a petri bowl and observed for any lustre in daylight through magnifying glass. No lustre was observed in the *Chendhooram*[5].

Physico-chemical investigations:

Physico-chemical investigations like pH value, Loss on drying at 105°C, Ash test have been done at The Tamilnadu Dr M.G.R Medical University, Anna salai, Guindy, as per the guide lines of WHO.

1. Solubility Test:

A pinch of sample ("*Chandamaarutha Chendhooram*") was taken in a dry test tube and to it 2 ml of the solvent was added and shaken well for about a minute and the results are observed. The test was done for solvents like distilled water, Ethanol, Petroleum ether, Propylene glycol, Toluene, Benzene, Chloroform, Ethyl alcohol, Xylene, Carbon tetra chloride and the results are observed individually.

2. pH value:

Potentio metrically, pH value is determined by a glass electrode and a suitable pH meter. The pH of the "*Chandamaarutha Chendhooram*" was written in results column.

3. Loss on Drying:

An accurately weighed 2gm of "*Chandamaarutha Chendhooram*" formulation was taken in a tarred glass bottle. The crude drug was heated 105^0 c for 6 hours in an oven till a constant weight. The percentage moisture content of the sample was calculated with reference to the shade dried material.

4. Determination of total Ash:

Weighed accurately 2g of "*Chandamaarutha Chendhooram*" formulation was added in crucible at a temperature 600^0c in a muffle furnace till carbon free ash was obtained. It was calculated with reference to the air dried drug.

5. Determination of acid insoluble ash:

Ash above obtained was boiled 5min with 25ml of 1M hydrochloric acid and filtered using an ash less filter paper. Insoluble matter retained on filter paper was washed with hot water and filter paper was burnt to a constant weight in a muffle furnace. The percentage of acid insoluble as was calculated with reference to the air dried drug.

6. Determination of water soluble ash:

Total Ash 1g was boiled for 5min with 25ml water and insoluble matter collected on an ash less filter paper was washed with water and ignited for 15 min at a temperature not exceeding 450^0c in a muffle furnace. The amount of soluble ash is determined by drying the filtrate.

7. Determination of water soluble extractive:

5gm of air dried drug. Coarsely powered "*Chandamaarutha Chendhooram*" was macerated with 100ml of distilled water in a closed flask for twenty-four hours, shaking frequently. The solution was filtered and 25 ml of filtered was evaporated in a tarred flat bottom shallow dish, further dried at 1000c and weighted. The percentage of water soluble extractive was calculated with reference to the air dried drugs.

8. Determination of alcohol soluble extractive:

2.5gm of air dried drugs coarsely powdered "*Chandamaarutha Chendhooram*" was macerated with 50ml. alcohol in closed flask for 24 hours. With frequent shaking, it was filtered rapidly talking precaution against loss of alcohol .10ml of filtrate was the evaporated in a tarred flat bottom shallow dish, dried at 1000 c and weighed. The percentage of alcohol soluble extractive was calculated with reference to air dried drug[6].

Details regarding experiment

Fourier Transform-Infra Red Spectroscopy (FTIR)

Fourier Transform-Infra Red Spectroscopy (FTIR) FTIR analysis was done at SAIF, IIT Madras. IR data was acquired using Perkin elmer FT-IR spectrometer. For sampling techniques, KBr method (Price, 1972) was followed. The sample was ground using an agate motor and pestle to give a very fine powder. The finely powder sample was mixed with about 100 mg dried potassium bromide salt. The mixture was then pressed under hydraulic press using a die to yield a transparent disc (measure about 13 mm diameter and 0.3 mm in thickness) through which the beam of spectrometer passed. The analysis was carried out using BRUKER RFS 27: Standalone FT-Raman Spectrometer[7].

Results

Results of siddha standardization:

Table: 1 Analysis as per AYUSH guidelines

S.No	Parameters	Results for ideal chendhooram	Results for CMC	Interpretation
1	Colour	Reddish	Reddish	*Chendhooram* colour
2	Floating of water	Floats on water	Floats on water	Lightness of drug.
3	Finger print test	Impinged in the fingers	Impinged in the Furrows of the fingers	Indicates fine particles of powder
4	Luster	Lusterless	Lusterless	Change of specific metallic character of raw material after grinding
5	Taste	No specific taste	No specific taste	Change of specific metallic character of raw material after grinding

Physico-chemical characterization:

1. The CMC Looked Like Red In Colour Under Normal Vision.
2. The LOD Value Was 42.16%
3. The Total Ash Value Was 1.35%,
4. Water Soluble Ash Less Than 1%,
5. Acid In Soluble Ash Less Than 1%.

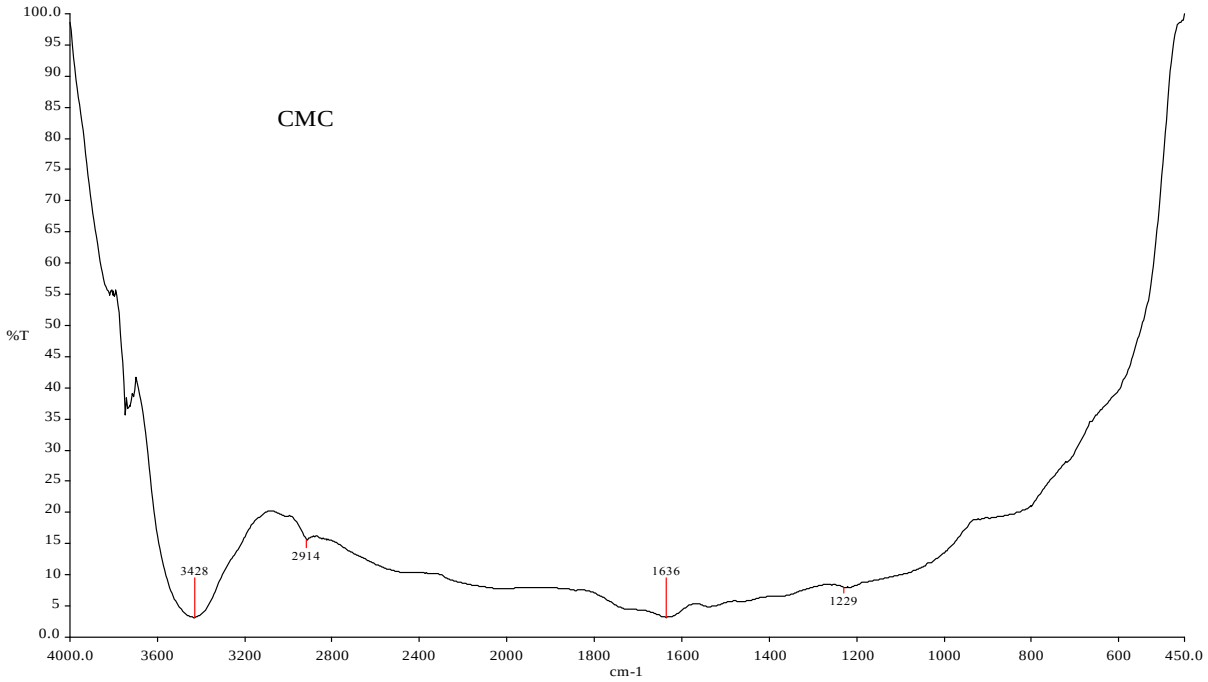

Fig no: 9. Fourier Transform Infrared Radiation (FTIR) analysis:

Table: 2. Functional group analysis:

S.No	Absorption peak cm-1	Stretch	Functional group
1	3428	O-H Stretch, H banded	Alcohol, phenols.
2	2914	C-H Stretch	Alkanes.
3	1636	C-O Stretch	α –β unsaturated aldehydes
4	1229	C-H wag ($-CH_{2X}$)	Alkyl halides.

Discussion

Physicochemical Characterization Shows that CMC Looked Like Red In Colour Under Normal Vision.The LOD Value Was 42.16%,The Total Ash Value Was 1.35%, Water Soluble Ash Less Than 1%, Acid In Soluble Ash Less Than 1%.FTIR analysis is utilized to find out the organic nature of sample as well as metal oxygen Stretching frequencies. The presence of some organic functional groups such as primary and secondary amines, alkanes, aliphatic compounds, esters, alcohols and alkyl halides were identified in the mineral Siddha medicine "*Chandamaarutha Chendhooram*" through FTIR Analysis These observed data from this FTIR characterization helps to standardize this Siddha compound drug "*Chandamaarutha Chendhooram*" regarding its functional behaviour.

The wavenumbers from 4000 cm-1 to 1500 cm-1 gives details for identification of functional group.

The wavenumber from 1500 cm-1 to 400 cm-1 provides particulars about molecular fingerprint.

The above result showed the presence of functional group like primary and secondary alcohol, phenols, alkanes, α –β unsaturated aldehydes, ketones, alcohol, alkyl halides in "*Chandamaarutha Chendhooram*".

They may be responsible for the presence of anticancer action of *CMC* in cancer

Conclusion

In this study, "*Chandamaarutha Chendhooram*" was prepared and analysed according to the standard procedures. This report could be used as a finger print for future references in standardization of "*Chandamaarutha Chendhooram*". The ingredients are purified and prepared, thus powder property of the samples were good for absorption and flowability. Organoleptic characters, physicochemical and FT-IR reveals the purification, Functional group and preparation processes were done in a hygienic condition. Findings revealed that samples were need more studies to standardize the drug and to evaluate the importance of Siddha drug preparation technique, which may reveal the scope for chemical modulation by traditional methods.

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