

## Evaluation of chemical composition of *vaalai rasa chendooram*: a gold based herbomineral Siddha drug

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### ABSTRACT

**Background:** *Vaalai rasa chendooram* is a Siddha herbo-mineral drug used in the treatment of several diseases such as cancer, AIDS and chronic skin diseases. Literature survey revealed that scientific study was lacking for this drug. The present study was aimed at the characterization of the physico-chemical traits of *vaalai rasa chendooram*.

**Materials and Methods:** *Vaalai rasa chendooram* was prepared as per Agathiyar siddhar method. The ingredients were sulphur, mercury, gold, alum, potassium nitrate and Aloe vera. The prepared drug was analyzed for chemical properties using Fourier Transform Infra-Red (FTIR), Zeta potential and Differential Scanning Calorimetry and Thermogravimetric Analysis (DSC-TGA).

**Results:** The heavy metals were absent except mercury (0.05ppm), which is below the acceptable limit. Gold (12.91%) is the major inorganic constituent presented with other heat stable organic compounds such as flavonoids, alkaloids, glycosides, serpentines, tannin and lignin. The particle size was 846.5nm.

**Conclusion:** *Vaalai rasa chendooram* is a heat stable gold-organics complex formulation. Future studies will be focused on the isolation of each organic compounds, evaluation of their pharmacological role and toxicology profile.

**Key words:** Siddha, Ayurveda, basma, metals, gold, traditional medicine.

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### INTRODUCTION

Siddha system of medicine is one among the great heritage of India. Siddha is the mother medicine of ancient Tamils/Dravidians of peninsular South India. The word Siddha means established truth. The persons who were associated with establishing such a Siddha school of thought were known as Siddhars. They recorded their mystic findings in medicine, yoga, and astrology. According to Siddha medical science, the Universe originally consisted of atoms which contributed to the five basic elements, viz., earth, water, fire, air and sky which correspond to the five senses of the human body and they were the fundamentals of all the corporeal things in the world. The uniqueness of Siddha medicine is providing

permanent cure for certain chronic diseases which are considered as non-curable. In addition to herbals and animal products, Siddha system also uses metal and mineral products namely *Parpam*, *Chendooram*, *Chunnam* etc.

Mercury and gold based Siddha drugs play a vital role in the management of chronic diseases in Siddha system. These formulations are a mixture of organic-inorganics and provide synergistic action with less toxicity.

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Treating metals with herbal juice leads to reduction in particle size.<sup>[1]</sup> *Vaalai Rasa Chendooram*, a gold based herbomineral Siddha drug described in ancient literature '*Agasthiar mahathirangam 800*', is being used in the management of cancers, AIDS and chronic skin diseases. Since, no scientific study has been done so far on this drug. We decided to prepare and analyze the physico-chemical of *vaalai rasa chendooram*.

## MATERIALS AND METHODS

### Raw materials

The raw materials such as cinnabar (*lingam* in Siddha), mercury, sulphur, potassium nitrate (*vediuppu*), rock salt, brick powder, pot, clay, aloe juice and alum (*padigaram* in Siddha) were purchased from Bhagavan Store, Raja Street, Coimbatore, Tamil Nadu, India. Gold (24 carat) was purchased from local jeweller.

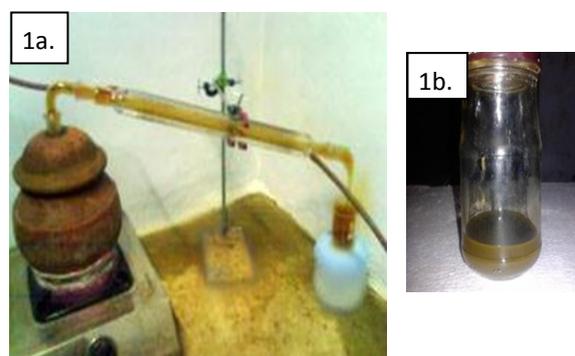
### Pre-drug preparation process

As mentioned in Siddha literature, certain steps or procedures were done before the actual preparation of *vaalai rasa chendooram*. It includes preparation of *vediuppu dravagam*, extracting mercury from cinnabar using *vediuppu thiravagam*, purification of mercury, purification of sulphur and purification of gold.<sup>[2]</sup>

#### *Preparation of vediuppu dravagam [Figure 1]*

Alum (525 g) and potassium nitrate (350 g) were ground as a powder. It was placed into a traditional mud made distillation apparatus (*draavaga vaalai yandiram* in Siddha) and was sealed with cotton and mud paste (*seelai*- a sealing process in siddha). Low heat was applied using a gas stove. The distilled fluid (*vediuppu dravagam*) was collected in a beaker. First 80 ml were discarded as it was believed traditionally that it would not possess medicinal use. The remaining (approximately last 40 ml) fluid was collected carefully and used for the extraction of mercury from cinnabar.<sup>[2,3]</sup>

**Figure 1: Preparation of *vediuppu dravagam* using traditional mud made distillation apparatus.**  
**a) Traditional mud made distillation apparatus**  
**b) Obtained *vediuppu dravagam***



#### *Extracting mercury from cinnabar [Figure 2]*

Cinnabar (1 kg) was taken as a single mass and ground with the above prepared *vediuppu dravagam* solution (150 ml) for six hours. The semi-solid resultant was placed in the bottom of the traditional mud made sublimation apparatus (*padhanga paanai* in siddha). After sealing the gap between upper and lower pots (*seelai* - a sealing process in siddha), heat was applied using gas stove for six hours. The whitish droplets, *vaalairasam*, that sublimated on the inner surface of upper pot were collected with the help of brush. This is the extracted mercury from cinnabar, which is believed to be less toxic for therapeutic purpose than other mercury.<sup>[2,4]</sup>

#### *Purification of mercury*

The extracted *vaalairasam* was ground with aloe juice in granite stone mortar for six hours. This process was repeated for seven times to render *vaalairasam* pure and safe for therapeutic purpose.<sup>[5]</sup>

#### *Purification of sulphur*

The sulphur was melted in a mud vessel and poured into the cow's milk kept in another vessel. The sulphur became solidified and the above process was repeated for 21 times.

Each time, fresh cow milk was used. At the end of this purification process, the color of sulphur turned from yellow to mild red color.<sup>[5]</sup>

### Purification of Gold

Gold was made as a plate by using hammer. A paste was prepared by grinding equal weight of brick powder and rock salt using lemon juice for three hours. This paste was applied on the gold plate to cover it completely and allowed for drying. This covering procedure was repeated seven times. After complete drying, the gold plate was washed with water.<sup>[5]</sup>

**Figure 2: Extracting mercury from cinnabar using traditional mud made sublimation apparatus**  
 a) Cinnabar b) semi-solid resultant of cinnabar in mortar c) Traditional sublimation apparatus d) Mercury extracted from cinnabar

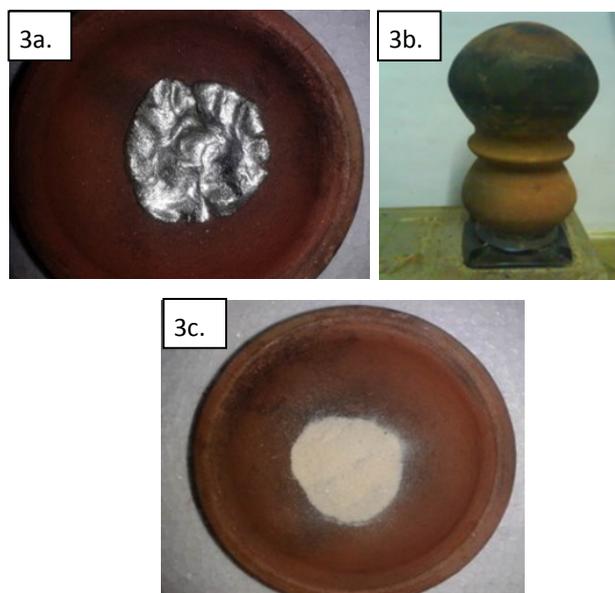


### Preparation of *vaalai rasa chendooram*

Purified mercury and purified gold were ground in a stone mortar for six hours. This mixture was kept within the traditional mud made sublimation apparatus (*padhanga paanai* in siddha) and the sealing of gap between upper and lower pots (*seelai* - a sealing process in siddha) was done. Mild heat (*deepakkini* in Siddha) was applied using stove by maintaining mild flame for six hours. After six hours, the

mild pinkish colored mercury-gold salt settled in the lower pot was collected.

**Figure 3: Preparing mercury-gold salt using traditional mud made sublimation apparatus**  
 a) Mixture of mercury and gold b) Traditional mud made sublimation apparatus c) Mercury-gold salt

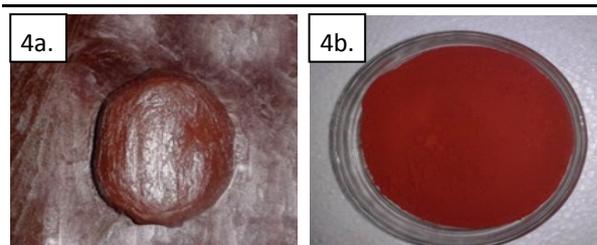


### Final step in *vaalai rasa chendooram* preparation

Above prepared mercury-gold salt was mixed with sulphur and ground using *vediuppu draavagam* for six hours. This semisolid paste was placed in traditional mud made sublimation apparatus. Moderate flame (*Kamalaakkini* Siddha) was started using stove, followed by heavy flame (*Kaadaakkini* in Siddha) for six hours. After six hours, the reddish colored *vaalai rasa chendooram* which settled down in

**Figure 4: Final step in *vaalai rasa chendooram* preparation using traditional mud made sublimation apparatus**

a) Semisolid paste b) *Vaalai rasa chendooram*



## Physico-chemical analysis

The chemical analysis was done by using Inductively Coupled Plasma Optical Emission Spectrometry (ICP-OES), Fourier Transform Infra-Red (FTIR), Differential Scanning Calorimetry-Thermogravimetric Analysis (DSC-TGA) and Zetasizer.

## RESULTS

The heavy metals such as lead, arsenic and cadmium were absent in this formulation. Even though 0.05ppm mercury was present, it is below the acceptable limit (1ppm) for Indian Traditional products as per the Government of India guidelines.<sup>[7]</sup> 12.91% gold is the major inorganic constituent in this drug. Analysis revealed that the drug also contains flavonoids, alkaloids, glycosides, serpentines, tannin and lignin [Table 1,2 and Figure 5,6]. These heat stable organic functional groups might have been derived from the aloe vera juice and lemon juice used during the drug preparation. There is a possibility for the formation of organo-metallic complex with these functional groups.

**Table 1: Shows the amount of inorganic elements present in *vaalai rasa chendooram***

Inorganic elements	Amount
Gold (%)	12.91
Total Potassium (%)	1.22
Total Nitrogen (%)	0.54
Total Calcium (%)	0.48
Total Magnesium (%)	0.16
Total Sulphur (%)	0.89
Total Phosphorus (%)	0.03
Total Sodium (%)	0.02
Ash (%)	0.06
Total Iron (ppm)	5.36
Total Manganese (ppm)	1.05
Total Zinc (ppm)	0.59
Total Mercury (ppm)	0.05
Total Copper (ppm)	0.02

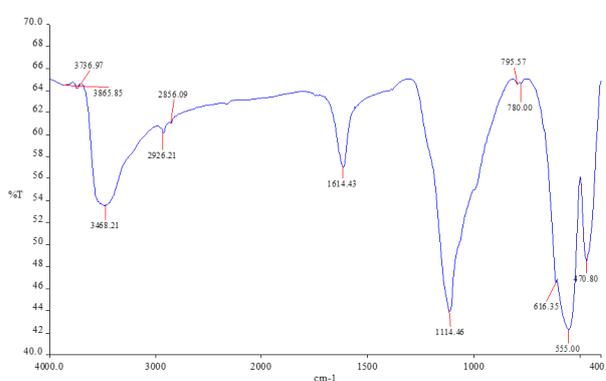
1% = 10000ppm,

1ppm = 1/1000000 or 1ppm = 0.0001%

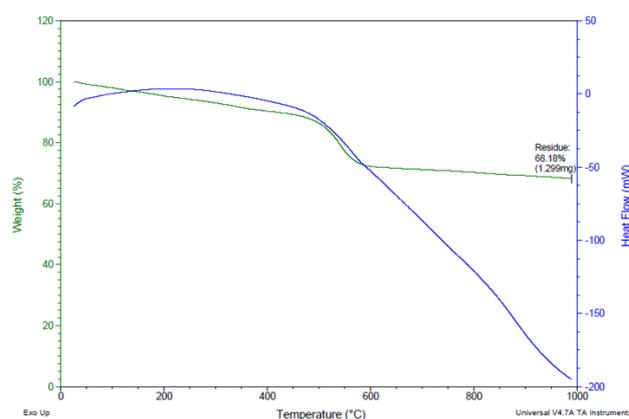
**Table 2: Shows the amount of organic compounds present in *vaalai rasa chendooram***

Organic compounds	Amount
Organic Carbon (%)	0.12
Total flavonoids (mg kg <sup>-1</sup> )	0.69
Total Alkaloids (mg kg <sup>-1</sup> )	0.42
Glycosides (mg kg <sup>-1</sup> )	0.28
Serpentines (mg kg <sup>-1</sup> )	0.19
Tannin ((mg kg <sup>-1</sup> )	0.03
Lignin (mg kg <sup>-1</sup> )	0.02

**Figure 5: The FTIR shows the presence of organic functional groups in in *vaalai rasa chendooram***

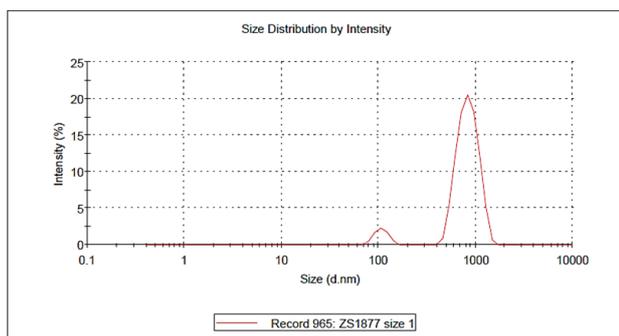


**Figure 6: Differential Scanning Calorimetry-Thermogravimetric Analysis (DSC-TGA) graph shows the presence of heat stable compounds**

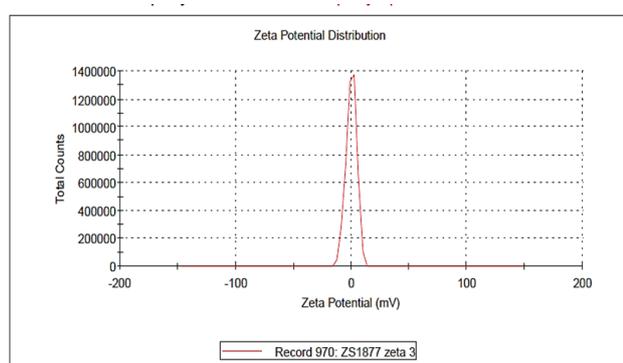


Zeta potential analysis showed that the average particle size was 846.5 nm and a potential of 0.141 mV, which suggested the better stability of the drug. [Figure 7, 8]

**Figure 7:** Graph shows the particle size of *vaalai rasa chendooram*



**Figure 8:** Graph shows zeta potential distribution of *vaalai rasa chendooram*



## DISCUSSION

There is an intense competition from other countries in the trading of traditional medicinal products. India's share in the world market is negligible as proper standardization techniques for the checking the quality is inadequate. This study is an earnest attempt at making appropriate scientific validation of metal based traditional Indian medicines. The results of ICP-OES, FTIR, DSC-TGA and Zeta seizer studies could be used as excellent physico-chemical fingerprints for the validation of medicine.

The present study was aimed at demonstrating simplicity and uniformity in the preparation of *vaalai rasa chendooram* using equipment like Liquid Petroleum Gas (LPG) gas burner. It is easy to handle, requires minimum manpower and continuous supply of heat is ensured with less pollution.

The present study evaluated the physico

-chemical properties of the traditional Indian medicine *vaalai rasa chendooram*. The results revealed that it contains gold along with few heat stable organics compounds. These organic functional groups might have been derived from herbals used in drug preparation. Mercury was the major ingredient before the drug preparations, but it became negligible in the finished product. Herbals used in drug preparation might be involved in removing considerable amount of mercury during the process. The role of mercury in this drug preparation is not understandable. It may be having some catalytic activity in the preparation of gold-organic complex or changing the particle size of the gold. Skin cancer, blood cancer, certain skin lesions and metallic taste are the expected and inevitable adverse effects seen with other oral gold preparations.<sup>[7]</sup> Though the amount of gold is high, it is claimed by Siddhars that, this drug is devoid of anticipated adverse effects seen with gold preparations used in modern medicine.

Gold plays an important role in diagnosis, microsurgery of ear and therapeutic applications. After the nano gold synthesis, the research on therapeutic application has been increased. Gold is proposed for use in chronic rheumatoid arthritis and cancers. Studies have proved that combining gold nanoparticle with other anticancer drugs could possibility target cancer cells in breast cancer and AIDS related Kaposi's sarcoma.<sup>[8]</sup> Siddha literatures claim that this gold formulation could be useful as rejuvenator, to delay ageing process, to improve immunity especially in AIDS disease and in autoimmune conditions.

In conclusion, *vaalai rasa chendooram* might be a gold-organics complex formulation. Future studies will be focused on the isolation of each organic compound and to evaluate their role in the claimed therapeutic conditions. Also the evaluation of toxicology profile is the essential component for its global marketing.

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**REFERENCES**

1. Austin A. Chemical characterization of a Gold and Mercury based Siddha Sasthric preparation - Poorna chandrodayam. American Journal of Drug Discovery of Drug Discovery and Development 2012;DOI:10.3923/ajdd.2012.
2. Ramachendran SP. Yukimunivar 300 &200 (Tamil). India: Thamarai Noolagam, Chennai; 1995.p.3-52-88.
3. Raghunandan.Yukimunivar Pidivatham 1000 (Tamil).India:Madurai kamaraj University, Madurai;1980.p.66,37-47.
4. Ramachendran SP. Ramadeva Vaithiya Cintamani700 (Tamil). India: Thamarai Noolagam, Chennai; 1993.p.24-5.
5. Mohan RC. Yacobvaithiyam300 (Tamil). India:Thamarai Noolagam, Chennai;2004. p.6-10-158.
6. Mohan RC. Agasthiar Mahathirangam 800 (Tamil). India: Thamarai Noolagam, Chennai; 2004.p.113-4.
7. Lohar DR. Protocol For Testing Ayurvedic, Siddha & Unani Medicines. Government of India, Department of AYUSH, Ministry of Health & Family Welfare, Pharmacopoeial Laboratory for Indian Medicines, Ghaziabad; P.36.
8. Panyala NR, Pena-Mendez EM, Havel J. Gold and nano-gold in medicine: overview, toxicology and perspectives. Journal of Applied Biomedicine 2009;7:75-91.
9. Giasuddhin ASM, Jhuma KA, HAq AMM. Use of Gold nanoparticle in diagnostics, surgery and medicine: A Review. Bangladesh J Med Biochem 2012;5:56-50.

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